CAPCOM Columbia Houston through Dakar and Ascension for 9 minutes total.

SPACECRAFT Hello Brewster, we're reading you at Dakar and Ascension.

CAPCOM Okay, read you five by, Jack.

PAO Shuttle Mission Control. Clearly not a lot of dialogue between the crew and the CAPCOM during this pass. Jack Lousma, once again, is involved in the induced environmental contamination monitor experiment and Gordon Fullerton in the mid deck of at the galley preparing for the noon meal the lunch meal onboard the Columbia. Also upcoming is some 16 mm camera set up for some documentatary photos onboard and Gordon Fullerton will be doing some more work with the electrophoresis experiment validation test. All 8 samples planned for the EEVT have been acquired the 8th having been done earlier this morning and Gordon Fullerton will be freezing some of those samples for to preserve them for further scrutiny once they are returned to the principle investigators.

END OF TAPE

CAPCOM And Columbia, Houston we're ready for the playback. Columbia, Houston we're ready to start the playback.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control, we'll have voice contact momentarily, to repeat that earlier anouncement the mission management team has determined at this point to press for a nominal landing Monday at White Sands.

SPACECRAFT should be getting it now Steve.

CAPCOM We've got a picture.

PAO This downlink television showing one of the earlier meal periods on board the vehicle.

SPACECRAFT Better cut that Steve, can you hear me, breaking up a little bit.

CAPCOM Columbia, Houston we've got a nose sun maneuver for you to dress up the attitude which is coming up in the next couple of minutes, be ready to copy.

SPACECRAFT Just a sec. Okay Houston, we had a super view of West coast we can see clear down to Salton Sea with the Baja down in the Baja Peninsula, we just came over Edwards Air Force Base, and now over Lake Mead in Las Vegas.

CAPCOM Sounds like quite a view. It's gonna be cloudy when you get down by Houston, it's raining here today and I have that attitude if you're ready to copy Jack.

SPACECRAFT Go ahead Steve.

CAPCOM Okay, for the nose sun maneuver, roll 166.1, pitch 5.7, and yaw 2.5, we'd like you to maneuver now as soon as you can using DAP B auto normal then initiate 2 times orbital rate rotation at 2 hours and 20 minutes, using DAP A auto normal, over.

SPACECRAFT Okay, I got it and I'll do it.

CAPCOM Thank you. That almost looks like fun. And Columbia, we've lost the picture. Jack, I do have an answer for you on a previous question about closing the doors.

SPACECRAFT Okay.

CAPCOM We do not anticipate any problems with the doors because their present temperature is warmer right now then they were after you warmed them up with top sun prior to closing them

successfully the last time. However, we will come back to you with more detail and if any malfunction procedures would be required other than those you have on board, we'll give them to you.

SPACECRAFT Okay, that's good news. Thank you Steve, and good answer.

SPACECRAFT This gonna do it for the downlink, or you want to keep?

CAPCOM Gordo, that'll do it and the TV system is yours. And Columbia, Houston, the TV is yours now.

SPACECRAFT Looks like we're right over St. Louis now Steve, looks like a beautiful clear day there in St. Louis.

CAPCOM It appears from our satellite weather map the cloudiness starts down in Northern Mississippi or somewhere Jack. Did you copy the TV is yours now?

SPACECRAFT I didn't get that, that's all you need for downlink right?

CAPCOM That's it, thank you very much those were good tapes.

SPACECRAFT You're welcome.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT A couple words for Dr. Morrison. The EEVT PI, his machine seems to be working, generally we have yet to see a single drop spilled anywhere. I'm working on the red blood cells right now and I'm seeing just the one band, I'm led to believe there might be two separate bands of blood cells, but I'm only seeing one, it's about between, 5 millimeters thick a little interesting (garbled) and it's moving along at about 10 millimeters per 10 minutes.

CAPCOM Okay, they copied that, thank you Gordo.

SPACECRAFT Just had the (garbled) twenty minutes and it's at the 50 millimeter mark, it took a big jump at first about one millimeter per minute speed.....

CAPCOM Roger.

SPACECRAFT Steve, do say hello to the folks in (garbled) I'll be remembering them.

CAPCOM Sure will.

SPACECRAFT (garbled) be right where you are right now.....

END OF TAPE

SPACECRAFT ...try to make audio all the way through this flight without any idea whether it's working or not.

CAPCOM Roger, there is no audio to the downlink Gordo.

SPACECRAFT ...real time, oh I see, that's right. It only come back

SPACECRAFT If we're going to fast forward now is about the time we ought to do it.

CAPCOM Okay we're ready for fastforward Gordo.

SPACECRAFT Okay, that was just a guess, we'll see what we get.

SPACECRAFT Okay now, I went right to the break here and now it starts with me on the second break.

CAPCOM Okay we have the picture back now.

PAO Shuttle Mission Control. This is a video recording of ...

SPACECRAFT Sure is easier than climbing around in the simulator isn't it.

CAPCOM Looks real easy.

PAO Mission Pilot Gordon Fullerton at the flight deck. And this of course is still video tape.

SPACECRAFT I guess we were remarking yesterday that, after being here, it's really going to be a grind getting back in fixed space and climbing up and down that ladder.

CAPCOM Not to mention all the paper work.

PAO You can see a caution and warning lamp test being conducted in the flight deck of the vehicle and the cathode ray tube in front of Col. Fullerton while it appears to be strobing that's just an artifact of the TV picture which has a different scan rate than the cathode ray display and it doesn't really look that way in real life.

CAPCOM Gordo, after LOS from Hawaii, let's just stop the playback and we'll try to start it up again at Goldstone. We think we'll have that.

SPACECRAFT Oh, okay. Well, we'll see how it goes here. That way we miss a little of Jack which is actually when he climbed out of the seat. I'm about to wind it up here in the end of the sequence we did.

CAPCOM Okay we're one minute LOS now.

SPACECRAFT I want to give you a little addendum here. We have got a little food I guess food preparation here that's set on the next sequence here.

CAPCOM And Columbia, we're 20 seconds LOS. We'll pick you up in the states in about 3 minutes.

SPACECRAFT Okay.

CAPCOM And you can stop the playback now.

SPACECRAFT Okay we'll stop it. When we come back, do you want to keep going as it was here or rewind to get the part we've had forwarded.

CAPCOM We'll try to keep going Gordo.

SPACECRAFT Okay we got we'll just sit right here until you give us a holler.

CAPCOM Roger.

PAO Shuttle Mission Control. Loss of signal through Hawaii. We reacquire over Buckhorn in 2 1/2 minutes.

PAO Shuttle Mission Control. Mission Elapsed Time 5 days 1 hour 58 minutes, Columbia on it's 83rd orbit of the earth. The mission management team has concluded a meeting reviewing weather conditions and has determined to make a nominal landing at White Sands on Monday at 1:27 Central time. We'll reacquire signal in one minute through Buckhorn. And we will have more video tape downlink replay over the continental United States during this pass. And we should have contact with the vehicle again in less than a minute. Mission Elapsed Time, 5 days 1 hour 59 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston. I've got you back through the states for 15 minutes. Over.

SPACECRAFT Okay Steve we're with you.

CAPCOM And we're not ready for the playback.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT Okay, I saw a big city down there and we'd like to say howdy to all the good folks in Perth, Australia.

CAPCOM We copy, thank you.

SPACECRAFT A special howdy to the plane training wing there at REF Piers where I spent a couple of pleasant days last about a year ago. That MET of enable is 4 days 22 hours and 47 minutes the forward light status was on, O N.

CAPCOM Okay, thanks a lot Gordo. Columbia, 1 minute to go. We're told that there's a decal on top of those cassettes that would tell you minutes left. You might use that as a gouge and in answering your thermal question is the attitudes are real good, the thermal temperatures appear to stablize and flatten out yesterday about mid day and they're slightly warmer than the predictions.

SPACECRAFT Okay, good, I'm glad to hear that. You got any predictions on difficulties of the payload bay doors like we had from tail sun?

CAPCOM We'll talk about that and get back with you at Hawaii if there are any. We're 30 seconds LOS and next is Hawaii in 11 minutes.

SPACECRAFT Okay, we'll be ready with the TV Steve, thank you.

CAPCOM Correction, that's 18 minutes.

PAO This is Shuttle Mission Control. We've had loss of signal at Yarragadee and the flight path this time misses the S-band station at Orroral Valley and we won't acquire signal again for another 17 minutes as the vehicle passes over Hawaii and during that pass there will be a downlink of video cassette recording of flight DAC activities taken by the crew earlier this morning. Mission elapsed time 5 days 1 hour 33 minutes. This is Shuttle Mission Control. This is Shuttle Mission Control. Mission elapsed time 5 days 1 hour 49 minutes. We're about a minute and 1/2 away from acquisition of signal through Hawaii and during this pass we'll have the about 6 minutes of downlink video of TV recorded on the flight deck earlier this morning. What we expect to see is principally the forward flight deck commander and pilot positions and some testing of caution and warning light systems that was connected by the crew early after the sleep period and just before breakfast this morning. The duration of this pass in Hawaii is a little more than 6 minutes and we will acquire signal there in about a minute. Columbia on its 83rd orbit of the Earth. We have acquired the telemetry data and we'll have a voice contact momentarily. Mission elapsed time 5 days 1 hour 50 minutes this is Shuttle Mission Control.

CAPCOM Columbia Houston through Hawaii for 6 and 1/2 minutes, over.

SPACECRAFT Okay, we're with you in Hawaii Steve.

CAPCOM Copy and we're ready for you to start the VTR playback any time Jack.

SPACECRAFT Okay, the wait just a second.

CAPCOM And we have the picture now Gordo.

SPACECRAFT Okay, Steve, what I thought I might try to do is we've got sequence here of Jack doing a thing and a seat and then it's followed by me, rider and we'll try to get them both in, they're, unless you can get some more dump time at Goldstone, we can just let them run all the way through. Stopping, of course, between sites or else I'll try to fast forward in the middle and cut out a little of the slow part till we get some of each of us.

CAPCOM Okay, we'll advise you on that Gordo.

PAO Shuttle Mission Control. A reminder that this is a video tape playback. You're not seeing a live picture now, this is some post

SPACECRAFT A little audio on this, I don't know if, I'm curious to hear if the audio is working because there is no way we can tell up here and I've been hot mike audioing all the

END OF TAPE

CAPCOM Stand by we got 15 seconds Gordo, next is Yarragadee in 13 minutes. Gordo, the answer is that it is the red blood cells and just to remove the camera, the cover and take the pictures.

SPACECRAFT Use the EEVT camera or some other camera is that right?

CAPCOM That's affirmative.

PAO This is Shuttle Mission Control, we've had loss of signal at Botswana mission elapsed time is 5 days 1 hour and 13 minutes. Mission Commander Jack Lousma reported the physical characteristics of the vehicle during the vernier RCS jet firing, the thermal soak back experiment. And Pilot Gordon Fullerton transmitted down some inquiries about the nature of the EEVT testing, the electrophoresis experiment, affirming that it was red blood cells and in this experiment to show you that if tissue was electrically charged so that it separates into it's constituent parts and the ground did reaffirmed that that proper sample was the red blood cell sample and gave him advise on documentary photography of that event. And this is the 8th and final sample being taken in the EEVT series. We'll have acquisition of signal again in 11 minutes through Yarragadee the UHF station at Yarragadee that'll provide voice only, and no data. Columbia's on it's 82nd orbit of the Earth, at mission elapsed time 5 days 1 hour and 14 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston through Yarragadee for 6 and 1/2 minutes, over.

SPACECRAFT We hear you at Yarragadee, and we are maneuvering to the attitude.

CAPCOM Roger.

PAO This is Shuttle Mission Control, we have a voice contact with the vehicle through UHF station at Yarragadee for voice only, no data. And, we're about 25 minutes away from a live downlink TV This .....

SPACECRAFT Steve, any word from the themal guy of how this is coming out, or how well we're conforming to the requirements and so forth?

CAPCOM I think your doing real well, we'll get some words for you on that. You might be interested to know when you did the water dump this morning earlier on, the mass spectrometer on the PDP measured a significant increase in payload bay pressure.

SPACECRAFT Yes, that's interesting isn't it? Yes we often

think that that's just a lot of water steering out the side there, when you look out the left side and you got some blackness against which the water was contrasted it just looks like a real heavy forceful blizzard and looks like all the droplets are about the size of marbles. And I guess the water was probably ice, cause I noticed that after the dump is over there is a few residual pieces floating around and some of them just float around and randomly flash the window in the regular and crystal in shapes, and frosted like ice.

CAPCOM Okay thank you, another comment here for you, is we'll be doing a VTR playback at Hawaii of forward flight deck activities, we would like you to have it set up, and when we get to Hawaii, we'll call you when we're ready for the start of the playback Jack.

SPACECRAFT Okay, and Gordo's diggng it out right now.

SPACECRAFT Steve, I've got that dug out and I have 180 feet, that must be around 10 minutes or so, are you going to be able to get all that? Or should I try to pick out the best of that 180 feet?

CAPCOM If you could, we'd like you to pick out the best because we have about 6 minutes at Hawaii Gordo.

SPACECRAFT Okay, does anybody know how many feet 6 minutes is real quick?

CAPCOM We're checking, I'll get that to you Gordo. Also, could you if you have time give us the actual MET in which you enabled TR1 channel 2 this morning?

SPACECRAFT Sure can, just a second. It's dark here right now Steve but I've some eyes were going to the West coast of Australia is that about right?

CAPCOM That's affirm, your crossing the Southwest coast.

SPACECRAFT Okay, well I saw a big city down there.

END OF TAPE

CAPCOM do so good it spoiled tomorrow's wake up call.

SPACECRAFT Well, I'll be darned. I guess we're getting calibrated on that. I hope you tell me the truth. I'm going to get you later if you're not, you know.

CAPCOM No it came through very well.

SPACECRAFT Okay, thank you. I played some music before here that didn't come out so good, so I appreciate that comment. Even if it's not true.

CAPCOM Oh it's true.

SPACECRAFT Okay, I'm getting your startracker going again, I guess you probably want to have that happen.

CAPCOM Okay, thank you.

SPACECRAFT A random water comment, a food preparation comment, the water chiller water, the cold water doesn't get to the gun till you squirt it about 8 or 10 ounces. The first 8 or 10 are luke warm then you get the chilly stuff. You kind of have to plan for that if you're making a cold drink.

CAPCOM Okay, good comment. And Columbia Houston, 45 seconds LOS. Botswana is next in 10 minutes. Remind you you're coming up on the VRCS thermal soak back test.

SPACECRAFT Okay, thank you Steve, we'll see you there at Botswana and we're getting set up for it right now.

PAO Shuttle Mission Control. Mission elapsed time 5 days 58 minutes. We had loss of signal through Dakar. Acquired about 9 minutes through Botswana, south Africa. The crew deferred flight testing the treadmill and the exercise equipment until later on in the flight. The photography downlink television of the bee experiment in flight motion of insects experiment, didn't leave enough time to set up the treadmill, so that'll be postponed till later on in the mission. Coming up on a thermal soak back test with vernier reaction control systems. And the pilot, Jack Lousma, will be gathering and the mission pilot, Gordon Fullerton, will be taking the 8th and last sample of the electrophoresis experiment while commander Jack Lousma is monitoring the vernier RCS heat soak back. We'll acquire signal again in about 8 minutes. This is Shuttle Mission Control at 5 days 59 minutes.

CAPCOM Columbia, Houston through Botswana for 4 and 1/2 minutes, over.

SPACECRAFT Hello, Steve, we're hearing you through Botswana.

We're in the middle of our vernier RCS test.

CAPCOM Okay, we'll leave you alone.

SPACECRAFT Tell you what (garbled). As I was talking about those big jets and so the other guys so when they go off it sounds like somebody just dropped on your roof.

CAPCOM Roger.

SPACECRAFT Okay, I did another vernier pulse there. Verniers is the only way to fly. Like I said, it makes a bump and kind of thud and it just vibrates through the whole spacecraft. It's not all that uncomfortable. What it does it keeps getting your attention when it happens and it shows there's really something happening out there.

CAPCOM Copy.

SPACECRAFT If you're floating free, why and say a yaw jet fires why it makes your legs swing from side to side even. And things that are hanging on the wall and just loosely are taped to the wall all move and anything like a TV camera that's on a bracket it also moves.

CAPCOM Okay, that's interesting.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Okay, I want to clarify just what to do with this EEVT sample 8. I want to make sure it is red blood cells, is that correct? And then, your additional instructions on photographing every 10 minutes, do you mean to use a different camera than the one I could, what I could do for instance, is take the cover off and then I put the analvelometer on the regular EETV somewhere to make sure that it takes a picture while the cover's off prior to putting the cover back on or did you intend something different there in the way of photographs?

CAPCOM Standby. We've got 15 seconds, Gordo, and next is

END OF TAPE

SPACECRAFT with something we were familiar with

CAPCOM Okay, that sounds fine.

SPACECRAFT So, Thorton doesn't believe we're ignoring him, Jack's getting all the straps on now, just to see how it's going to work.

CAPCOM Okay.

PAO This is Shuttle Mission Control, we've had loss of signal at the Mainland of the United States, and we'll acquire again in about 3 and 1/2 minutes through Dakar. The astronauts showing some acquired skill in televison production during that pass. And some video of the student involvment project. A joint venture between NASA and the National Science Teachers Association, which is designed to stimulate the study of science and technology in secondary school systems. And that experiment was one of 10 finalist from this year's competition of insects in flight motion study. Todd Nelson, to whom the astronauts referred is the 18 year old science student, who submitted that experiment. And he was sponsored by the aerospace and defense group of Honeywell Inc. The PGU unit, the unit that the astronauts were displaying just as the video expired was the heflex bio-engineering test, which is the plant growth unit experiment in determining the relationship between soil moisture content and the heighth of plants grown, they're using sunflower seeds, or sunflower plants contained in small metal viles and each has a different soil moisture content. Following the flight each of those will be measured and the results will be compared with the soil moisture levels and this will be used for a standard for further experiments to be done in the Spacelab 1 experiments. This experiment was flown during the STS-2, but because the flight was abbreviated then due to the minimum mission because of fuel cell difficulties there wasn't sufficient time to germinate those plants so this plant growth experiment represents a re-flight of that earlier test. We'll have acquistion of signal again in about a minute. Mission elapsed time is now 5 days 48 minutes, this is Shuttle Mission Control. We have acquisition of signal now at Dakar.

CAPCOM Columbia, Houston through Dakar for 8 minutes, over.

SPACECRAFT Yes, got you through Dakar. We just had a lemonade beverage container varier and it's caused a mess here, just a minute.

CAPCOM Roger.

SPACECRAFT Steve, you know that don't you?

CAPCOM Say again Jack.

SPACECRAFT I say stand by, we just had a lemonade beverage container varier and it's got a little mess going here.

CAPCOM Okay, we'll stand by.

SPACECRAFT I was just commenting you know that it's the simple things in life that get you.

CAPCOM That's right.

SPACECRAFT You might tell my friend Bill Thorton that I got strapped up and latched onto the treadmill and got it semi-adjusted and it looks like it's going to work pretty good, if I don't have to (garbled) right now.

CAPCOM Okay, we'll pass those words to Bill, thanks Jack.

SPACECRAFT For a matter of keeping notes. What's happening is, the beverage container, this was the third one that's broken off right at the top left, just below the valve seems to be a weak point in the design in there, and we'll talk more about it when we get back, and show Rita what the problem is.

CAPCOM Okay, thank you Gordo.

SPACECRAFT You still there Steve?

CAPCOM We're still with you.

SPACECRAFT How did the music, the Flight of the Bumble Bee come through, did it come through like music or did it come like trash?

CAPCOM Came through so good it spoiled tomorrow's wake up call.

END OF TAPE

SPACECRAFT from one place to another. (garble) as you might have thought. The surprise is, of course, our walkers. I think Todd Nelson's going to have a kind of a messy job cleaning this box up but I think it was an interesting experiment, hope you got some others Todd.

CAPCOM Well, we're sure getting a really good picture down here, Jack, and that was a very interesting explanation of your observation.

SPACECRAFT There's a couple moths up here in the top really going after each other. They must not be compatible in these close quarters. I don't notice that any of the larvae have hatched out yet. That's kind of hard to tell. I don't think any of them have. They look pretty well just the way they did when we first saw them. But, once again, this was a experiment submitted by Todd Nelson from Minnesota, a high school science student and high school science students across the land. The opportunity to be involved in a space project by submitting experiments that are in competition to be selected for space flight. There'll be several on future flights, so our congratulations to Todd. We've enjoyed working his experiment and hope that it's provided something productive. Surely it's the first experiment that's had insects flying in space with the exception of the fruit fly that we carried along with us from Florida which we haven't seen anymore of since. A last question for Todd, where do we look for the honey, Todd, so we can have some on our toast for breakfast tomorrow?

CAPCOM We'll try to get you an answer on that and I'm sure Todd appreciates those comments.

SPACECRAFT Joe, I switched back to the project camera I believe it is. We'll give you a quick look at the PGU express in here.

CAPCOM Okay, we're ready, we're looking at it.

PAO Shuttle Mission Control. PGU is a product growth experiment.

CAPCOM And Gordo, we're about 20 seconds from losing the TV.

SPACECRAFT Okay, you can see we have many many numbers we've been calling down to you, hopefully recorded here, and we read them out on this little bitty LAD readout here and cycle through the six chambers. The six chambers are lined up right along here and have three varieties of plants. We're kind of anxious to see how they look when we get it back on Earth Monday.

CAPCOM Okay, we have lost the picture now. And the

cameras are back yours.

SPACECRAFT Okay.

CAPCOM We weren't sure what they the object over the top of the PGU was there.

SPACECRAFT Well, that's something somebody sent along some farmer gardener I guess.

CAPCOM Okay, we understand that.

SPACECRAFT Just wanted to know we're doing our best, but we don't make any promises cause we can't get in there and fool with this thing.

CAPCOM Okay. And that was an excellent show guys.

SPACECRAFT Well, that's show biz you know.

CAPCOM And Jack, the sponsors of the PGU experiment appreciate the coverage you gave them.

SPACECRAFT Well it pays to advertise. Hey, that brings up a good question. How did the Cougars do in the NCAA?

CAPCOM Standby 1. And Gordo, the semifinal game is at 2:30 this afternoon.

SPACECRAFT Okay, well our best wishes to the home team and maybe you might keep us posted occassionally on how they're doing.

CAPCOM Okay, we'll try to do that.

SPACECRAFT They're playing the Tar Heels right?

CAPCOM That's affirm.

PAO Shuttle Mission Control. A little NCAA playoff update exchanged between the crew and CAPCOM.

CAPCOM Columbia, Houston, we're 30 seconds LOS at Bermuda. Dakar is next in 4 and 1/2 minutes and we sure thank you for the good show.

SPACECRAFT Okay, we'll have to work in the exercise tapes a little later but we haven't had much practice for that so we figured we'd go with something we were familiar with.

END OF TAPE

CAPCOM ...don't need to do it.

PAO This is Shuttle Mission Control. Payloads and ground control have both reported to the flight director that they're go for bees. And we may have, if we can get the ground sight configured at MILA on time we may have some unscheduled downlink TV of the student experiment.

CAPCOM Columbia, Houston MILA is going to be ready for live TV and we should be there in about 5 minutes, if your going to do it, can you tell us which camera you'll be using?

SPACECRAFT Well Brewster, we're going to have both flight deck and middeck set up I think, and I think we'll make it.

CAPCOM Okay, we copy that. Sounds good.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Okay, for INCO (garbled) switch the (garbled) flight deck camera which is a wider angle view and we'll bring the bugs out and set it up and then as we're talking and becomes obvious he can switch to the middeck camera which is the close up view on the bugs, Okay.

CAPCOM Okay, we copy that, sounds like a good plan.

SPACECRAFT I think once we get started on it, then it's up to him what he wants to do.

SPACECRAFT I have downlink already so I could get to the wide angle view which is the flight deck.

CAPCOM Okay, we have a picture.

SPACECRAFT Okay, we'll get with it here.

CAPCOM Stand by one Gordo, we got the wrong camera selected right now, we still have to wait for MILA.

SPACECRAFT (garble) Brewster.

CAPCOM Stand by one.

SPACECRAFT Got anything at all?

CAPCOM Gordo, we have the flight deck camera selected now, can you turn off the overhead light?

SPACECRAFT No, I gotta have some light on, is that better?

CAPCOM Okay, it was the last one, that middeck one that was the one we were looking for.

SPACECRAFT Is it better now?

CAPCOM Okay that looks good.

SPACECRAFT Okay, we'll go ahead and get the bees out.

SPACECRAFT Okay, space fans, here is the second in the episode of the bees and moths in space. From your first in history space swat team, gonna get a buzz out of this one. Here they come (Flight of the Bumble Bee music).

CAPCOM Boy, those things sure make a lot of noise, don't they Jack?

SPACECRAFT Boy they sure do make a lot of noise. It's hard to sleep at night sometimes, them buzzing away the way they do. If fact we have some very lively moths left, the bees have pretty well all got stationary, the flies have decided to give up flying and just walk, all the flies are just walking around on the side of the plexiglass here. We got some of the bees flying you can still see some of them are moving and they have taken to walking and see that one floating right there, he's not even flapping his wings, I think the bees got smart fast, they decided there wasn't any use flapping their wings and going out of control, so they just float around and wiggle their legs. As far as the moths go, they like to stand on the sides too, but a lot more of them seem to fly, some of them seem to have adapted flying from one place to another.....

END OF TAPE

PAO ...them to take a time lapsed photograph, still photograph of the VCAP experimentation and enhancing the probability that we'll get a good image on film of the electrically charged particle beam fired from the back of the vehicle. We have AOS Hawaii for about 3 minutes now. We're processing Hawaii data presently and this is a fairly low elevation pass of about 5 degrees at it's maximum elevation. That's about 2.8 right around 3 degrees presently.

CAPCOM Columbia, Houston through Hawaii for 2 1/2 minutes over.

SPACECRAFT Aloha.

CAPCOM Aloha to you too Jack.

SPACECRAFT We got some TV scheduled here coming up pretty soon. Is that live or is that just VTR for exercise.

CAPCOM We show that VTR Jack.

SPACECRAFT Okay thank you.

CAPCOM And Jack we'd like to have a cycle of both star tracker shutters please.

SPACECRAFT All righty I'll do that for you.

CAPCOM Thank you.

PAO This is Shuttle Mission Control. That question from Mission Commander Jack Lousma.

SPACECRAFT ...I was thinking if you wanted some live TV over Goldstone, I'm going to be where we could give you a quick shot of the bees and the moths.

CAPCOM We're talking about it Jack. Hang on.

SPACECRAFT ..take them out here and take a look at them.

SPACECRAFT We've still got some moths fluttering around in there.

CAPCOM Jack, we're told we can't have it ready in time. We're 5 seconds to LOS. See you over the states in four minutes.

SPACECRAFT Okay.

CAPCOM We'll give you further words over the states.

PAO Shuttle Mission Control we've lost signal over

Hawaii. Mission Commander Jack Lousma offered to provide a little live TV of the student experiment, the inflight experiment of insects in zero gravity. The Goldstone station unable to configure in time to support that and we're looking now to see if we can support a live downlink TV over MILA and it looks like we're probably be able to do that. Payloads reported that the VCAP experiment is completed and their stowing the gear associated with that and the crew activity plan also shows now an exercise period coming up in just few moments. We're flight testing a treadmill and both Commander Jack Lousma and Pilot Gordon Fullerton are scheduled to spend some time on the treadmill, one taking video tape recordings each taking video tape recordings of the other during the exercise period. And those exercise periods are about 15 minutes in duration. And it's just to provide some cardiovascular exercise and to prevent atrophy of the major muscles muscle groups during this zero gravity. The effects, cumulative effects of 5 days in space. And we'll acquire signal again in about 1 1/2 minutes through Buckhorn. Mission Elapsed Time 5 days 25 minutes, this is Shuttle Mission Control.

PAO Shuttle Mission Control, we've got acquisition of signal at Buckhorn.

CAPCOM Columbia, Houston through Buckhorn for 7 minutes.

SPACECRAFT Loud and clear.

CAPCOM Okay I yelled at you going over the hill. Don't know if you heard, we're trying to gin up something through MILA for the live TV.

SPACECRAFT That's okay. We've sort of We'll try to get ready also then.

CAPCOM Okay, well don't push it if not convenient. We don't need to do it.

END OF TAPE

SPACECRAFT Okay. We've got the TV running of course like we did before and so the VTR is up and going and before we just did the vernier jets and water dump, the flash didn't show up quite so distinctly when the jets fired but on the TV now when one of these big fellows booms off why it lights up the whole picture .

CAPCOM Okay, that's great Jack, I hope we get some good VTR that we can look at postflight on that and a comment, we see that there are two cassettes that are really not spoken for right now and you might want to continue trying to get some good VTR's those jet firings even perhaps for the jet test.

SPACECRAFT And we're in column 5 on page 1-31.

CAPCOM Okay Jack, sounds great. Thank you.

SPACECRAFT Got to play attempt to try to see it visually. We turned every light in the cabin off and looked at there between jet firings when it was really dark but no hint of any beam at all sad to say.

CAPCOM Okay. Columbia Houston, we're 20 seconds LOS. We'll see you through Orroral Valley in 2 minutes.

SPACECRAFT Okay, I'm having to substitute cameras for the last four columns. D camera's in behind the arm and of course Charley camera's broke, and I'm using the forward cameras.

CAPCOM Okay, copy that. Columbia Houston through Orroral Valley for 4 minutes, standing by.

SPACECRAFT Okay, loud and clear. We got a lot of noise on the loop.

CAPCOM Copy.

SPACECRAFT Okay, that's about it now. Brewster we got an idea.

CAPCOM Glad to hear it.

SPACECRAFT How about before we run out of darkness here we make one good long exposure put the DAP and manual pulse in free drift and make sure we don't get any jet firings while we do it. That ought to be our best shot at getting a clean picture.

CAPCOM Standby 1. Gordo that's ok but you may get out of attitude doing that. If you do you'll have to do a new maneuver back to that attitude, cause when you go back into the DPP it'll snap out where you're at, so you'll have to do an attitude maneuver in the current DAP with a low deadband back to that attitude and then pull out your own roll phasing.

SPACECRAFT Okay, understand.

CAPCOM And if you want to do all that you're a go. We're LOS now. See you at Hawaii in 15 minutes.

SPACECRAFT Okay.

PAO Shuttle Mission Control at 5 days 16 minutes into the mission. Coming up on acquisition of signal through Buckhorn. The crew's still involved with the VCAP, vehicle charging and potential experiment. Reported some good video, good also good video of the rather spectacular effects reported by them and by the earlier Shuttle crews of the forward RCS jet plumes which are rather long tongues of flame that come from the RCS port steering during firing, so when we get a look at that video when the vehicle's back on Earth why that should provide some spectacular views of RCS ignition. And according to summary time line the crew should be just about wrapping up its VCAP experimentation. They had planned to put the vehicle in the drift which is taking it off of the autopilot which keeps it in the proper configuration. The purpose of that being to enable them to take a time lapse photograph

END OF TAPE

PAO Acquisition of signal at Yarragadee in about 10 minutes. This is Shuttle Mission Control. This is Shuttle Mission Control, 4 days 23 hours 45 minutes. The vehicle charging and potential experiment or VCAP that is going on onboard Columbia right now is designed to measure the electrical characteristics of the space shuttle including the center action with the plasma environment of the ionosphere, which is the environment, through which the orbiter flies. And, the experiment in concert with the Plasma Diagnostic Package provides data measurements about the behavior of the vehicle with respect to the ionisphere and the plasma environment and the dynamics produced by the environment, or by the orbiter as it passes through the ionisphere. During this portion of the experiment the astronauts will be performing induction electrification, which is using a low power fast pulse generator that emits a 1000 volt beam of electrons, the pulses will very in duration and will be emitted at the various repetitous rates or in a steady stream. The experiment was replicated in this Space Enviroment Simulation Laboratory the SESL here at Johnson Space Center. And, some low speed photography and time lapse photography indicated that the charged electrical beam could be visible under certain circumstances. And although in earlier VCAP experiments the crew had not reported, or had reported the beam was not visible there is a considerable optimism that may be visible on video tape or on still photography. The experiment weighs about 275 pounds, it's located in the forward portion of the payload bay pallet, on the port side of the payload bay. And the vehicle currently is in the nose sun attitude and roll rate is established so that the crew as it looks out the aft windows of the flight deck will have a back drop of the blackness of space against which there is a greater probablity that they'll be able to see that charged particle beam. We should acquire voice contact through the UHF ground station at Yarragadee Australia in just about 2 and 1/2 minutes, they'll be no data through Yarragadee in as much as it has been no S-Band capability. We'll pass through a brief keyhole of about a minute and pick up the S-Band station at Orroral Valley and be in contact there for about 4 minutes, and we will get both voice and data at that location. So in about 2 minutes we'll be hearing from the crew and probably get an update on the progress of the VCAP vehicle charging and potential experiment and again the Plasma Diagnostic Package was activated earlier in the day, one of the earliest actions that the crew took in those two payloads will be working together during this portion of the experiment. Mission elapsed time, 4 days 23 hours 49 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston through Yarragadee for 6 minutes, over.

SPACECRAFT Okay, we got you loud and clear, we're tanking away, starting column 4 on the search here.

CAPCOM Okay, sounds good Gordon.

SPACECRAFT It occurs to me Brewster that when the jets fire it's just gonna obliterate whatever we might get on this high speed film.

CAPCOM Jack, I guess we have no comment on that.

SPACECRAFT Okay.

END OF TAPE

PAO ...configuration and with the roll rate established so that the aft end of the vehicle will continue to provide the crew with a background of darkness to give them greater opportunity to see the that charged particle beam which is released from the aft end and enhance the probability that charged particle will be visible to the crew or to the video tape into the video camera. That experiment is scheduled to begin at approximately 4 days 23 hours 25 minutes. In just about a minute and a half from now. And it continues for ... The VCAP experimentation takes about an hour after which the crew goes into an exercise period first with commander Jack Lousma exercising on the onboard treadmill and some photography of his exercises by Gordon Fullerton and then they exchange roles with Commander Lousma photographing the exercise of Gordon Fullerton and they'll be exercising on a treadmill which is onboard it's a fairly contemporary conventional looking treadmill. The astronauts wear sort of a harness which is in a rather conventional appearing belt around their waist with some lanuards which go are attached to that belt and to mounting points on what is essentially the floor of the middeck onboard the vehicle to keep them from drifting away from the treadmill and to provide some security and friction in the absence of gravity to keep them from drifting away from the treadmill as they jog along on top of it. Those exercise periods are about 15 minutes in duration for each crewmember. Mission Elapsed Time 4 days 23 hours 25 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston through Indian Ocean for 1 minutes over.

CAPCOM Columbia, Houston through Indian Ocean over.

PAO Shuttle Mission Control Mission Elapsed Time 4 days 23 hours 39 minutes. We've just passed the opportunity for contact at Indian Ocean Station and it's a very low elevation just 1 degree and no exchange of voice contact on that mission although we did get data from that pass and payloads officer verified to the flight director that the crew initiated the VCAP beam experiment. The vehicle charging potential experiment based upon downlinked telemetries that's available to the payloads officer here in the Mission Control Center. And the next opportunity for voice contact will be in about 15 minutes over Yarragadee. Columbia is on it's 81st orbit of the earth. The orbit ranges from an apogee of 134.8 nautical miles to a perigee of 124.5 and the orbital period is 1 hour 29 minutes 25 seconds. Mission Elapsed Time 4 days 23 hours 41 minutes, Columbia of course still in a nose sun attitude and the cabin temperature accordingly is sort of cozy compared to the temperatures recorded during the tail sun attitude during which time the during the tail sun period the cabin temperature usually ranged in the low 70's and the cabin temperature onboard the

vehicle now is 81 degrees which is an artifact of the nose sun

attitude and the radiant heat which passes through the flight decks panoramic windows. Those six windows which sweep round the crew cockpit. Humidity onboard is 42 percent and steady and cabin pressure is about 14 pounds per square inch.
Acquisition...

END OF TAPE

CAPCOM Standby, I'm checking on that.

SPACECRAFT Okay. And I got another question for you payload people there. This teleprinter call to make a 15 minute VTR of best views, generally, we jvQh VTR the whole VCAP sequence. Is that not do you want to do something different than that?

CAPCOM Okay, I'll check on that Gordo. Standby 1. Columbia Houston, Jack in reference to your question about normal jets, they would like you to press on doing the EEVT even though you're on normal jets, over.

SPACECRAFT Okay.

CAPCOM And Gordo, we're still working on the VTR question.

SPACECRAFT Okay.

CAPCOM Columbia Houston, we're 20 seconds to LOS. Dakar is next in 7 minutes and Gordo, we'll have your answer for you then.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control. Mission elapsed time 4 days 23 hours 12 minutes. Columbia commander, Jack Lousma, is changing the attitude of the vehicle although it is maintaining no sun position there. Some roll, pitch and yaw maneuvers to fine tune the orbit. And they're preparing to do some VCAP visual searches, vehicle charging and potential experiment where it will be firing some charged particles from the aft section of the payload bay and there'll be some video acquired on video cassette recorders onboard the vehicle. We're loss of signal period. Reacquiring in about 5 minutes thorugh Dakar and on the west of Africa. Mission elapsed time 4 days 23 hours 13 minutes this is Shuttle Mission Control.

CAPCOM Columbia Houston through Dakar for 3 minutes, over. Columbia Houston through Dakar for 2 and 1/2 minutes, over

SPACECRAFT Okay, we're at Dakar.

CAPCOM Okay, Jack, the answer to Gordo's question is that he may use an entire 30 minute cassette on the VCAP beam search and we will gin up another one tomorrow for the VCAP beam at that time.

PAO This is Shuttle Mission

CAPCOM Columbia Houston, how do you read?

SPACECRAFT Okay, got you a little so garbled but understandable.

CAPCOM Okay, Gordo, did you copy the comment on using an entire 30 minute cassette today?

SPACECRAFT Yea, we just go on as normal, use up the whole cassette.

CAPCOM That's affirmative.

SPACECRAFT I think we're going to be ok on cassettes, we got plenty left as far as I can see.

CAPCOM Okay, that's what we thought as well. Columbia Houston, we're 30 seconds LOS. We may pick you up through Indian Ocean in 16 minutes for about a minute. It's a very low elevation however and next would be Yarragadee in 30 minutes.

SPACECRAFT Okay, Brewster, we'll get the VCAP on here.

CAPCOM Okay, see you later.

PAO Shuttle Mission Control. Mission elapsed time 4 days 23 hours 21 minutes. Capsule communicator, Brewster Shaw, advising the crew that there is a very low elevation as we pass over or pass by the Indian Ocean station, 1 degree of elevation. If we are able to have voice contact at all that it'll be only for about a minute and apart from that the next opportunity is over Yarragadee, Australia in about 1/2 hour. We will acquire Indian Ocean station in about 15 minutes. Columbia pilot, Gordon Fullerton, was engaged in discussion with the ground concerning selection of a video tape cassette for making the video record of the VCAP or vehicle charging and potential experiment. The Orbiter is still in a nose sun configuration and with a roll

END OF TAPE

CAPCOM Columbia, Houston through Buckhorn for 2 more minutes standing by.

SPACECRAFT Okay Brewster. We just went through the routine with the verniers. And just wrapping that up. And the procedure went real good Brewster and we're getting ready to maneuver to a roll of 179.2 and so forth at 2300 and be on it nominally. You agree with that.

CAPCOM Roger and that roll is 179.2 Jack.

SPACECRAFT Roger copy 179.2 and we have it typed in.

CAPCOM Okay great and glad to hear the maneuvers went well.

SPACECRAFT Back there when we first started this we were in the dark and I turned down the lights looking out the aft windows here with all the induced primary sightings due to the vernier pulses and made quite a fireworks show.

CAPCOM I'll bet it did.

PAO Shuttle Mission Control. Payloads Systems Officer here in the Mission Control Center has affirmed that the PDP plasma diagnostic package has been activated and Gordon Fullerton's remarks pretained to the plume which is produced by the firing of the forward RCS engines.

SPACECRAFT It's CAVU at Northrup I can see. Got the lights (garbled) and all the White Sands loud and clear.

CAPCOM That's great. We're going to lose you now for about 30 seconds. Pick you up in MILA.

SPACECRAFT Okay.

PAO Mission Elapsed Time 4 days 22 hours 59 minutes. Passing through a keyhole between the Buckhorn and MILA stations. Loss of signal for just a half a minute. We'll reacquire momentarily. Gordon Fullerton remarking there that he could see the what is now the primary landing site at Northrup Strip from his vantage point 130 nautical miles in the air.

CAPCOM Columbia, Houston's back with you.

SPACECRAFT Okay we issued the maneuver.

iCAPCOM Okay fine and the weather man agrees with your observation there and says Northrup's going to be pretty good for the next couple of days.

SPACECRAFT That's good news.

SPACECRAFT Pretty gray over Texas down there.

CAPCOM Roger all of that is supposed to be moving towards the East.

SPACECRAFT And do you like our rotational rate of .135 or .134 for this one Brewster.

CAPCOM .135 would be what we'd like to have this morning Jack.

SPACECRAFT Okay I'll type that into the vernier slot too just to keep my bookkeeping safe. I guess I won't use it.

CAPCOM Roger.

CAPCOM Columbia, Houston. You'll be getting Tank B quantity message shortly.

SPACECRAFT Okay thank you.

CAPCOM Columbia, Houston. We see the water message and we also have noticed that Tank E quantity has been erratic and you should disregard that quantity indication. Additionally the ground has turned down the PDP transmitter and you are go for the VCAP beam visual search on time.

SPACECRAFT Okay we were just going to ask you about that tank ECHO thank you.

SPACECRAFT Still with us Houston, Brewster?

CAPCOM We're still here Jack.

SPACECRAFT I noticed that at 105 you want us to do another electrophoresis but it also looks like to me we're going to be in our normal jets and that's a no no for electrophoresis if I understood.

CAPCOM Okay standby one and we'll verify that.

SPACECRAFT And I also notice you want to do sample 8, however, we have sample 7 yet to do also. Do you want to do 8 before 7 or 7 then 8.

CAPCOM Jack we want to do sample 8 as scheduled.

SPACECRAFT And you don't mind doing it during normal jet huh?

CAPCOM Standby I'm cha#=ZoZK/)L

c!B* UY&4hPr:m . (jU 9*9h 35V GM, 86:14v39 PAGED3

SPACECRAFT Okay.

END OF TAPE

CAPCOM Gordo, the answer is, after your water dump last night, you dumped it to less than 10 percent and when it was filling back up to prevent it toggling around 10 percent and giving you an alarm they set it from the ground to off scale low, and we're not sure if that explains why you see the limit at 130 percent, but the limit was reset last night.

SPACECRAFT K+x VPmaybe it was -130 and that's a good explanation and thanks.

CAPCOM Okay. Columbia, Houston I referenced for that change to the water dump parameter limit is on 53-Alpha, message 53-Alpha, and one question for you folks, which wireless headset was Jack using that failed?

SPACECRAFT He Jack was using the Alpha headset, I have B on, it's working fine.

CAPCOM Okay, thank you. Columbia, we're 30 seconds to LOS, next is Orroral in 2 minutes.

SPACECRAFT Okay, we'll see you there.

CAPCOM Columbia, Houston through Orroral Valley for 4 minutes, over.

SPACECRAFT Okay, hearing you loud and clear. Steve, while my transmitter was broken there, I received a message related to some greetings from my fellow Dutchman, is that correct?

CAPCOM That's affirmative, they're following the flight with great interest Jack.

SPACECRAFT Okay, and I want to say that I am Dutch, and I have many friends and relatives in the Netherlands and I'd like to send my best regards and wishes to them. And, while we're talking about that, I happen to know that this is the Bicentenneal year for the 200 years of unbroken diplomatic and trade relations between the Netherlands and the United States. And, it's going to be celebrated in the United States and also in Holland, and in connection with that the Queen will be visiting the United States the State visit next month sometime. And, I know that she will be welcomed and I would respectfully like to send my best wishes in regards to Queen Dietrichs (Queen of Nethelands) and Prince Clause and the Royal family and hopefully we'll be able to see them when they come next month.

CAPCOM Okay, thank you very much Jack. Columbia, Houston we'd like to have you put the star trackers back in track and cycle the shutters please.

SPACECRAFT Okay. We're going to start an auto fuel cell purge Steve you wanna watch it go?

CAPCOM Roger, we have 50 seconds left in this pass Jack, go ahead. Columbia, we're 25 seconds LOS now, see you next at Buckhorn in 25 minutes.

SPACECRAFT See you at Buckhorn.

PAO This is Shuttle Mission Control, mission elapsed time 4 days 22 hours and 30 minutes. We've just had loss of signal over Orroral Valley station. And Columbia's on it's 81st orbit of the Earth, and the next contact will be in about 1/2 hour at Buckhorn. As Columbia sweeps up and enters the North American Continent just in the Baja area and goes streaking across North America and exiting the Continent right along the Northeast coast right about New Jersey. And, we will have quite a long pass of contact with the vehicle as it goes across those North American ground stations. Commander Jack Lousma is performing a fuel cell purge onboard the vehicle now, which is done periodically to assure that no contaminants get in the fuel cell system and inhibit the performance of those devices which of course provide electricity to the vehicle while it's on orbit. Mission elapsed time, 4 days 22 hours 31 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission control, mission elapsed time 4 days 22 hours and 38 minutes. And just a few moments from now, according to the summary timeline, Mission Pilot Gordon Fullerton is scheduled to activate the Plasma Diagnostic Package, of course we're in a loss of signal period right now and we'll reacquire in about 15 minutes over Buckhorn, so we should be hearing affirmation of that action when we do reacquire. Plasma Diagnostic Package is not to be deployed today, but we'll nevertheless acquire data while the vehicle's in orbit through the open payload bay doors. Mission elapsed time, 4 days 22 hours 39 minutes, this is Shuttle Mission Control.

END OF TAPE

CAPCOM ...pretty high up there.

SPACECRAFT Okay. Unfortunately there's a bunch of tourists down there.

CAPCOM Okay you're about the pass the max antenna elevation right now.

SPACECRAFT Oh, there's too many clouds. Have to wait till next time.

CAPCOM Okay that's too bad. We do have the water dump quantity for you on your up coming dump.

SPACECRAFT Go ahead with the water dump number.

CAPCOM Quantity bravo to 10 percent over.

SPACECRAFT Okay bravo to 10 as usual.

CAPCOM Columbia, we've got one comment for Jack. We understand that your Dutch friends and relatives are following this flight also with great interest.

SPACECRAFT I'm not hearing you. For some reason you're not transmitting. We're checking this wireless here.

CAPCOM Okay fine.

SPACECRAFT I really appreciate (garble) this.

SPACECRAFT I was hoping to get a picture of the Space Shuttle so that I could make a trip back there and present it to the people at the site.

CAPCOM You wouldn't want to go there.

CAPCOM Columbia, Houston. We're 30 seconds LOS next is Yarragadee in 9 minutes.

SPACECRAFT Okay we'll see you there.

PAO An audio check on PAO commentary testing 1,2,3,4,5,4,3,2,1. Test off.

CAPCOM Columbia, Houston through Yarragadee for 6 1/2 minutes over.

SPACECRAFT Okay we're reading you loud and clear Steve, how me now?

CAPCOM I got you 5 by now Jack.

SPACECRAFT Okay I apparently had a transmitter failure with my well last time I changed the batteries and that didn't seem to work either I couldn't transmit to Gordo either so what I've done I've run the charlie unit now which was the backup unit and seems to be working all right. The receiver in the other one is okay but inability to transmit.

CAPCOM Okay we copy you on the Charlie unit.

SPACECRAFT Well Steve if you've got the time we have some numbers for you here.

CAPCOM Okay. Are these PGU numbers.

SPACECRAFT That's affirmative. Took a reading at 4 days 21 hours 13 minutes power light was on and the temperatures were 24.1 24.2 24.0 24.1 24.2 and 24.5. The lights were all okay. The lamp status was off.

CAPCOM Okay that's a good copy. Gordo do you have last nights readings by any chance.

SPACECRAFT Yes sir, 4 days 10 hours 36 minutes. Things were a little warmer in there at that time. 26.0 26.0 25.8 25.9 26.7 27.7 lamp status was O-N on. Need any more.

CAPCOM That will do it. Thanks a lot Gordo. One comment on the upcoming VRCS thermal soakback test. You'll be running the wideband mission recorder on that and the tape is getting fairly close to it's limits so I caution you to be careful to get it off on time for the checklist. Over.

SPACECRAFT Okay and I have a IMU align time of 4 days 21:49 and 30 seconds.

CAPCOM We copy thank you.

SPACECRAFT I got a kind of surprising thing. I went to set the SM alert on tank bravo to 10 percent for the water dump which is running right now, and the last I had seen it I think it was set there to 10 percent but somebody on the (garbled) moved it up to I think it was +130 percent or something. How'd that happen.

CAPCOM Standby.

END OF TAPE

PAO This is Shuttle Mission Control. One correction. I had said that the dead band was 2 degrees and in fact it's programmed in at 1 degree and again the control teams offer was to change that to 3 degrees which was declined by the crew. Mission Elapsed Time is 4 days 21 hours 35 minutes and we have another minute and a half remaining in this pass.

CAPCOM Columbia, Houston. We're 20 seconds LOS. Next is Madrid in 5 1/2 minutes.

SPACECRAFT Okay.

PAO Shuttle Mission Control. 4 days 21 hours 42 minutes. We're just a few seconds away from acquisition of signal over Madrid.

CAPCOM Columbia, Houston through Madrid for 6 minutes over.

SPACECRAFT Okay we're with you at Madrid Steve.

CAPCOM Okay Jack. I just got a couple of things for you. One is a reminder to do the IMU alignment with the stars that are presently in the table and the other is a switch on panel L2.

SPACECRAFT Okay. I'll check you up here right now.

CAPCOM Roger. On panel L2 N2 system 1 supply open check the talkback open. Over.

SPACECRAFT N2 system 1 supply is open now and talkback is open.

CAPCOM Okay thank you Gordo. Your configuration now is both supplies 1 and 2 of N2 are flowing through system 1 when we did isolate the leak in system 2 earlier.

SPACECRAFT Okay, that looks (garble) right.

CAPCOM Columbia, Houston. Could we please have spec 60 again on the SM machine.

SPACECRAFT Okay just a minute.

CAPCOM Thank you.

SPACECRAFT Let's see. I got 3 stars here and did you specify which two are the best.

CAPCOM Star 24 and 45 are the recommended ones.

SPACECRAFT Okay I see they're already selected.

SPACECRAFT And you just better go ahead an align on (garble) correct.

CAPCOM That's affirmative.

CAPCOM Columbia, Houston. We're 15 seconds LOS now. See you next at IOS in 12 minutes. CRT 4 is yours. You can resume spec 60.

SPACECRAFT Roger.

PAO Mission Elapsed Time 4 days 21 hours 50 minutes. We'll have acquisition of signal in 10 1/2 minutes at Indian Ocean Station. Columbia on it's 80th orbit of the earth. Just presently over North Africa.

CAPCOM Columbia, Houston through IOS for 6 1/2 minutes.

SPACECRAFT Okay Steve. Looking at the orbital map can you tell how close we come to the (garbled) station are we north or south of it.

CAPCOM We'll check that for you. Gordo, it's a close call the antenna elevation is 55 degrees so you're going close to right over it. We think maybe just a little bit south but we're not sure.

SPACECRAFT I might try to get a picture of it when I get over to that window.

CAPCOM Okay.

SPACECRAFT Give me a call at closest approach if you can tell and give me a time. I don't have time to figure it out before we'll be by it probably.

CAPCOM Okay.

CAPCOM Gordo, we'll try to give you a call when we see the antenna elevation reach it's maximum. It's not there yet.

SPACECRAFT Okay thanks.

CAPCOM Okay Gordo, I think you can start looking now. The antenna is getting pretty high up there.

END OF TAPE

SPACECRAFT We got the spec 60 Steve.

CAPCOM Okay, thank you. Columbia, Houston, CRT 4 is yours with a reminder to resume spec 60, over.

SPACECRAFT Resume it is. This quite a different way to fly than the big jets. Sounds like you keep running into something every now and then especially when it's kinda low deadband and really do a lot of banging.

CAPCOM Roger.

SPACECRAFT Steve, the jolt of the Spacecraft is not as severe as I was led to believe. But the general thud because through ricochets through the structure is the most disconcerting part of it.

CAPCOM Good input Gordo, thank you.

SPACECRAFT And quite a spectacular forms when your on the night side, they really show up. It be nice if we could figure out a way to photograph them, I doubt that you can though.

CAPCOM Sure would be a good picture, if you could get it.

SPACECRAFT Someone check and see how many total VTR cassettes should be on board. I've used up 13 so far, and I found 6 more, I'm not worried about running out, I think we got most of that done but, just for my own information, are there anymore than the 19 that I found so far?

CAPCOM We'll check that number for you, and I'll get back to you Gordo.

PAO Shuttle Mission Control, Columbia Pilot Gordon Fullerton there describing the sensation of and the visual appearance of the RCS jets firing on orbit. Still 7 and 1/2 minutes left in this pass.

SPACECRAFT Steve, we just got a FPEG overload, are you taking care of that down there?

CAPCOM That probably has to do with the TMBU we just sent up Gordo.

SPACECRAFT Okay, well we'll ignore it, unless you need help on it.

CAPCOM Columbia, Houston if you find all that primary RCS firing objectionable you have your option of opening the deadband up to 3 degrees and reduce the jet firing, over.

SPACECRAFT Oh no it's more a matter to notice, certainly isn't bothering us. So we're happy with it.

CAPCOM Okay, that's fine Gordo, it's not a consumables problem. We found out on the video cassettes, there are 22 total on board, the 3 that you apparently have not found are for the OSS and their in MF57E, over.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control, the CAPCOM's advise to the crew that they can change the deadband to 3 degrees, simply means that the Columbia's now in a deadband of 2 degrees which means that the vehicle can go 2 degrees off of the nose sun attitude before the vernier jets and the RCS jets make an adjustment to bring it back to the ideal attitude. That was in the offer to change that to 3 degrees was in response to Gordon Fullerton's remarks about the disconcerting nature of the large RCS jets firing and size of the plume and the sensation of running into something. The flight control team advised, if Gordon Fullerton or the crew found that an objectable sensation they could change that deadband to 3 degrees which simply means that the RCS jets would fire less frequently. And, Colonel Fullerton's response was that that would not be necessary.

CAPCOM Columbia, Houston have the heater reconfiguration for you, two switches on panel A12, if it's convenient.

SPACECRAFT Well let's see what we got.

CAPCOM Okay, on panel A12, hydraulic heater elevon A to auto, and B to off, OFF, over.

SPACECRAFT Okay A auto B off on the hydraulic heater elevron, thank you.

CAPCOM Thank you.

SPACECRAFT They looking for something?

CAPCOM Gordo, they're looking for heater response data in the cold attitude that we're in.

SPACECRAFT Okay.

END OF TAPE

CAPCOM Columbia Houston through Indian Ocean for 3 minutes. Standing by.

SPACECRAFT Hello there, Brewster, took care of the star tracker and also did the 3 items that you wanted to do right about now and we'll continue with breakfast unless you got something for us, what can we do for you.

CAPCOM No sir, we're just here if you need us.

SPACECRAFT Okay doke.

CAPCOM Columbia Houston, we're 10 seconds to LOS. Yarragadee's next in 10 minutes and the star trackers are in term idle you need to bring those back up and cycle spec 21.

SPACECRAFT Okay, those guys are not very cooperative, are they, we just did that.

CAPCOM Copy. Columbia Houston through Yarragadee for 7 minutes, over.

SPACECRAFT Okay, we're at Yarragadee, we're just making breakfast Brewster.

CAPCOM Okay, Jack, don't want to interrupt that but we do see that you're a bit out of attitude and at your convenience we'd like you to maneuver to a new nose sun attitude that we have for you.

SPACECRAFT Go ahead.

CAPCOM Okay, the attitude is roll 106.9, pitch 5.7, yaw 2.5 and you can maneuver in A auto norm.

SPACECRAFT Okay and what time do we then set the rotation?

CAPCOM Okay, you start the rotation then at 2115.

SPACECRAFT 2115?

CAPCOM That's correct.

SPACECRAFT Okay, thank you.

CAPCOM Yes sir. Columbia Houston, 20 seconds LOS. Orroral Valley's 2 minutes away.

SPACECRAFT Did you call Brewster?

CAPCOM Just the LOS call Jack.

PAO This is Shuttle Mission Control at mission elapsed time 4 days 20 hours 50 minutes. Passing through a brief keyhole between Yarragadee and Orroral. We'll reacquire in about a minute.

CAPCOM Columbia Houston through Orroral Valley for 4 minutes. Standing by.

SPACECRAFT Okay, we're putting down chow here and taking pictures, Brewster. Wish you were here. Need the support crew here to wash the dishes.

CAPCOM We sure would be glad to. Columbia Houston, we see two good stars in the table. You can go term idle to save those and torque them at your convenience.

SPACECRAFT Okay, Brewster.

CAPCOM Columbia Houston, 30 seconds LOS. Mila's next in 1/2 hour. Enjoy your breakfast.

SPACECRAFT Thank you sir. We'll see you at Mila.

PAO Shuttle Mission Control. We're just moments away from voice contact through Mila for a pass of a little over 8 minutes. Mission elapsed time 4 days 21 hours 25 minutes.

CAPCOM Columbia Houston, got you through the states for 11 minutes, over.

SPACECRAFT Morning, Steve, glad to hear from you this morning.

CAPCOM Top of the morning to you and could you give us spec 60 on an SM machine please and we'll reenable some FPEG limits.

SPACECRAFT Okay, we'll do that momentarily.

CAPCOM Okay, we got a vector coming up to you during this pass also, Jack.

SPACECRAFT Good, thank you. We got the spec 60 Steve.

CAPCOM Okay, thank you.

END OF TAPE

CAPCOM Gordo, it looks like it does change the DAP card and that would be A5.

SPACECRAFT Okay.

CAPCOM Columbia Houston. That's all we have for you at this time and we anticipate you completing your 16 mm activities.

SPACECRAFT Let's see if they'll be (garble) in action down there.

CAPCOM Okay. We all look forward to seeing them.

CAPCOM Columbia Houston. We're be going LOS and Madrid's next in 6 minutes.

SPACECRAFT Okay Brewster. You broke up on that one. I think my wireless battery is on its way out. Will you say once again?

CAPCOM See you at Madrid.

SPACECRAFT Hasta la vista.

PAO Shuttle Mission Control at 4 days, 20 hours, and 9 minutes. We're AOS at Madrid.

CAPCOM Columbia Houston through Madrid for information only. IOS site will be UHF uplink only. We are now recording voice. You may cancel your IMU maneuver and when you get a chance we need a Y-tracker shutter cycle. Standing by.

SPACECRAFT Okay. I'm hearing you Brewster. Thanks a lot. We will take care of the Y-tracker, and omit the IMU maneuvers.

CAPCOM Roger, and we're standing by.

CAPCOM Columbia Houston. Ten seconds LOS. See you at Indian Ocean in 13 minutes.

SPACECRAFT Okay Brewster.

PAO Mission elapsed time 4 days, 20 hours, 15 minutes. This is Shuttle Mission Control. We've lost signal through Madrid. Vehicle is just over the Mediterranean Sea now. Just a little south of Italy. We'll have acquisition of signal in about 12 minutes through Indian Ocean station. Columbia is on its 79 orbit of the Earth and at this juncture in the crew activity plan, at this point in the activity plan, the crew is still in the breakfast period and they will be setting up for 16 mm film operations. Documentary photography during the early part of the morning and earlier this morning, Columbia pilot, Gordon Fullerton, indicated that he had taken some

motion pictures of Commander Jack Lousma shaving and doing some of the presleep, or post sleep activity. Mission elapsed time 4 days, 20 hours, 17 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Mission elapsed time 4 days, 20 hours, 23-1/2 minutes. We've had handover in the Mission Control Center from Flight Director, Tommy Holloway and his outgoing shift, the Ivory Team has briefed and passed control to Flight Director, Hal Draughn and the Crystal Team. Tommy Holloway is presently leaving the Mission Control Center and is on his way to the Change of Shift Briefing in Building 2, Room 135, the Johnson Space Center News Center and that Change of Shift Briefing will occur on time at 6:30 this morning. We'll have acquisition of signal in 3-1/2 minutes through the Indian Ocean station. Columbia on orbit 79. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. We've had acquisition of signal at the Indian Ocean station. We are now processing downlink data and also have the opportunity for voice contact in this 3, 3-1/2 minute pass. Mission elapsed time 4 days, 20 hours, 28 minutes.

END OF TAPE

PAO 4 days, 12 hours, 34 minutes, and 3 seconds. And during the sleep period last night, we went well beyond that and now have more than exceeded the time on the air frame in those are 2 earlier missions combined. Again mission elapsed time is 4 days, 19 minutes, 52 seconds, compared to STS-1 and 2 combined of 4 days, 12 hours, 34 minutes. Just moments away from acquisition of signal at MILA, this is shuttle mission control.

CAPCOM Columbia Houston through Mila for 9 minutes, over.

SPACECRAFT Oh, we got you loud and clear, how are we?

CAPCOM Loud and clear, and good morning.

SPACECRAFT Can I clarify a couple of things about the CAP update?

CAPCOM Roger, go ahead.

SPACECRAFT Okay, the first thing I noticed changed is (garble) starts at 2200. And for some reason, Jack got the idea talking last night that we were going to change the hour between 2100 and 2200, did you decide not to, and do we go ahead as printed, at 2100?

CAPCOM Okay, we thought that that had gotten passed up previously. Essentially, all the activities on page 4-95 have been deleted, except for the first 3 items under the pilot column. The dual G2 OPS, the interconnect, and the VRCS thermal soak back. Those 3 items have been moved up to page 4-94 to begin at 2020. The rest of the activities on page 4-95 from 2100 to 2200 have been deleted.

SPACECRAFT Okay, I guess that's what he did get, but we were surpised we just didn't see that in this mornings CAP update. We wondered wether they meant it or not?

CAPCOM Okay, the reason for that was just not to repeat it, that they thought it would be clear.

NETWORK (garble)

SPACECRAFT Okay, then so all that has been picked up in the, so all the things that are deleted there are picked up in your update.

CAPCOM Some of the things will remain deleted. Those things that need to picked up later will be picked up later and are in your cap update, over.

SPACECRAFT Okay, I see, and then does this give us some 16 mm (garble) is that the idea.

CAPCOM That affirmative.

SPACECRAFT Okay, I think that's going to work, in fact we're getting a production right now of Jack shaving.

CAPCOM Okay, and I do have a couple of notes for you that will affect those first 3 items.

SPACECRAFT Okay, Brewster, go ahead with them.

CAPCOM Okay, last night we told you to, during the interconnect that you were going to interconnect from the left OMS. Well due to the addition of the cold OMS restart later on today, we want you to connect from the right OMS instead.

SPACECRAFT Okay, I make it on the right OMS (garble)

CAPCOM Okay, and then relative to the VRCS thermal soak back test, the steps for that are in the orbit OPS checklist on page FS1-7 and we have one change to the dead band for the normal jet attitude.

SPACECRAFT I better go get the orbit OPS checklist.

CAPCOM Okay, let me know when you're ready.

SPACECRAFT Okay, I got the checklist in hand, give me a page please.

CAPCOM Okay, that's flight supplement 1-7.

SPACECRAFT Okay, shoot.

CAPCOM Okay, almost halfway down the page under DAP A it says, deadband attitude normal, item 8 plus 5 execute. That should be item 8 + 1 execute for 1 degree deadband, over.

SPACECRAFT Okay, does that change the DAP card? Go ahead, we'll figure it out.

CAPCOM Gordo, it looks like it does change the dap card and that would be A5.

SPACECRAFT Okay.

END OF TAPE

CAPCOM 20 seconds to go Columbia and all the TPR messages have been or are onboard this time. We'll pick you up at Orroral in about 2.

SPACECRAFT Okay Davie, I'm reading the morning newspaper here. I noticed that it gets longer and longer to read it these days.

PAO Mission Control Houston. 4 days 19 hours 15 minutes, mission elapsed time. We just completed that pass over the Yarragadee tracking station and have a short LOS period here of about a minute and a half before we reacquire at Orroral Valley. That was a taped message from the families to help wake the crew up this morning and Gordon Fullerton indicated they must be suffering from a little shuttle lag there as he said it was an unusal wake up. They took the shades off this morning and saw the moon disappear behind the Earth and noticed it was quite dark outside so they won't be coming up over the sunrise again for a little while just until they get around to this part of the Earth. On orbit number 78 at 4 days 19 hours 15 minutes mission elapsed time. This is Mission Control Houston.

CAPCOM Columbia Houston back with you through Orroral for 10 minutes.

SPACECRAFT Okay Dave and we see some more paper coming.

CAPCOM Rog. They were suppose to give me enough time to let you know it was coming. It's the weather data that's coming. And Columbia Houston at your convienence, you could help us on star alignments if you would cycle the shutter doors.

SPACECRAFT Okay.

CAPCOM Columbia Houston we're about 30 seconds to LOS here at Orroral. Mila is next in 30 minutes. The ivory team will be signing off here shortly. We'll plan on picking up again tommorrow evening. Correction this evening.

SPACECRAFT Okay that's great Dave. We thank you for sticking with it all night and for making a good plan and we're looking forward to carrying it out.

CAPCOM Okay and we'll try to reduce the paperwork tommorrow morning.

SPACECRAFT No problem, I was just kidding you a little bit. We're just glad to hear from you.

CAPCOM Roger see you now.

SPACECRAFT And a nice job again on TMBU's, not a single

alarm, you're setting a record that's going to be hard to beat.

CAPCOM Thank you Gordo.

PAO Mission control Houston. At 4 days 19 hours 23 minutes mission elapsed time. We are in orbit 78 and just passed out of range of the Orroral tracking station in Eastern Australia. Columbia passing out over the Pacific Ocean now on the upswing and to starting orbit number 79 and we'll be reacquiring over the US in about 30 minutes. 4 days 19 hours 23 minutes mission elapsed time. This is Mission Control Houston.

PAO This is Shuttle Mission Control. Mission elapsed time is 4 days 19 hours 51 minutes. We're about 2 minutes away from acquisition of signal over Mila, ground station in Florida. We are being in contact with the vehicle about 7 and a half minutes during that pass, we really don't expect an awful lot of air to ground dialog at this juncture with the crew just awake and eating breakfast. Undoubtly the flight control team will let them begin their morning rather leasurely. Although the mission commander Jack Lousma has acknowledge rather lengthy teleprinter information and a morning paper as he characterized it was a little bit larger growing longer by the day as CAP updates and mission notes are teleprinted up to the crew. The duration of STS-3 has now surpassed the combined duration of STS-1 and STS-2 put together. STS-1 and STS-2 constituted a total of 4 days 12 hours and 34 minutes and 3 seconds. And during the sleep period last night we went to well beyond that and now have more than exceeded the time on the air frame and two earlier missions combined. Again mission elapsed time is 4 days 19 minutes 52 seconds compared to STS-1 and 2 combined of 4 days 12 hours 34 minutes. Just moments away from acquisition of signal at Mila. This is Shuttle Mission Control.

END OF TAPE

PAO ...Building 2 standing by for acquisition of signal through Yarragadee. This is Mission Control Houston.

CAPCOM Bon journo nave especial esa Columbia (garble) Houston.

SPACECRAFT Buenes Dias Senior. Como esta.

CAPCOM Muy bien Senior.

SPACECRAFT (garble)

CAPCOM Columbia, we have nothing for you this morning except some sounds from your family if you're ready to listen.

SPACECRAFT Oh yeah, we're always ready to listen to that.

CAPCOM Okay. Sounds good. We've got 4 and 1/2 minutes left in this pass.

TIMOTHY LOUSMA Alright you guys. Wake up. Five more minutes. 5 more minutes. You guys are going to be awake. Better get up.

MARY LOUSMA How'd you sleep last night Dad? I sleep with my eyes closed.

GRATIA LOUSMA Can Joseph say Daddy?

JOSEPH Daddy.

GRATIA LOUSMA Can Joseph say Mary?

JOSEPH Mary.

GRATIA LOUSMA Can Joseph say Ma. Ma?

JOSEPH Ma Ma.

GRATIA LOUSMA Can Joseph say Matt?

JOSEPH Matt.

GRATIA LOUSMA Can Joseph say one?

JOSEPH One.

GRATIA LOUSMA Two?

JOSEPH Two.

GRATIA LOUSMA And what does a cow say?

JOSEPH Moo.

GRATIA LOUSMA What does a dog say?

JOSEPH Bow wow.

TIMOTHY LOUSMA Get up, get up. It's a great day for the race. This will be a great day in which to excell in.

GRATIA LOUSMA Good morning honey. I'm sure all of this that you've just heard brings you back down to Earth again. We don't want you to get too comfortable up there and decide to stay. My prayer for this new day is that God might be reflected in our lives the way he is in this beautiful universe that he's made and you're getting a chance to see. I'm reminded of the verse that this is the day that the Lord hath made. Let's rejoice and be glad in it. God bless you. We love you and have a good day.

ANDREW FULLERTON Good morning Dad. This is Andy. I hope you have a good trip at the Space Shuttle launch. I love you and miss you. I can't wait until I get to the launch and landing. Don't forget to look out and try to look out and see Texas and I'll be waving at you. Good bye.

This is Molly. Good morning. Time to get up and I hope to see you at the landing and when you look down, try to see me. I love you and I miss you. Bye.

MARIE FULLERTON Morning Gordo. This is Marie, Mom. (garble) We love you. Have a good day Gordon and Jack.

CAPCOM Hello Columbia. That was live from Command Mission Control Center.

SPACECRAFT Great to hear from that part of the team. We're looking forward to seeing all of them and it was a good idea and it all came through loud and clear.

CAPCOM Okay Jack. We've got a little over a minute left here.

SPACECRAFT Okay. Well it sounds just like home. Been a kind an interesting morning to wake up. It was a beautiful, sunny as the alarm went off and we pulled up the window shade and looked out there and about half way through the pass, the sun went down and now it's black as night.

CAPCOM Roger that.

SPACECRAFT I guess we'll just roll over and go back to bed.

CAPCOM You might want to after you read the CAP update.

SPACECRAFT Yeah. We'd save that till about noon or so.

CAPCOM Twenty seconds to go Columbia and all the TPR messages of interest are onboard at this time. We'll pick you up at Orroral in about 2.

SPACECRAFT Okay Davey, I'm reading my morning newspaper here. I noticed that it gets longer and longer to read it these days.

PAO Mission Control.....

END OF TAPE

PAO This is Mission Control Houston. 4 days 17 hours 6 minutes mission elapsed time. Currently on orbit number 77. And the Columbia is passing over the northern coast of Africa. Current altitude of the orbiter is about 137 nautical miles. Currently receiving data through the Madrid tracking station. Flight director Tommy Holloway has just recently asked for a status check in Mission Control for the system engineers who report that all of our systems are doing well as the crew continues to sleep and they have about two hours left in their sleep period at this time. The last minute touches are being placed on the teleprinter messages to the crew for the morning teleprinter send up there where they will make adjustments to their flight plan for the day. And review any anomalies that have occurred during the flight. 4 days 17 hours 8 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. 4 days 18 hours mission elapsed time. Columbia is currently on its 77th orbit of the Earth and out over the South Pacific right now. Starting on the ascending portion of the orbit, heading up toward South America. The crew has just about an hour left in their sleep period. Flight controllers in mission control are putting the final touches on the teleprinter messages that will be going up to the crew shortly to help outline their day activities. When the crew gets up in about an hour, we still will not be conducting much business with them as they have a 45 minute post sleep activities for arranging things in the morning, washing up and getting ready for the day. And then in another 15 minutes for reviewing the teleprinter messages before they begin breakfast. 4 days 18 hours and 1 minute, mission elapsed time. This is Mission Control Houston.

MRS. LOUSMA (recording) This new day is that God might be reflected in our lifes the way he is in his beautiful universe that he has made and you're getting a chance to see. I'm reminded of the verse that this is the day that the Lord has made, let's rejoice and be glad in it. God bless you, we love you and have a good day.

PAO Mission Control Houston at 4 days 19 hours 8 minutes mission elapsed time. We are currently on orbit number 78. And about to reacquire communication with Columbia, the first call up of the day over the Yarragadee tracking station in Western Australia. Flight controllers in Mission Control are preparing to send up the teleprinter messages this morning with the changes in the crew's scheduled today and any other information and greetings that their passing on to the crew this morning. And we may hear a special recording this pass for the wakeup call. Press conference for the off going flight control team and flight director Tommy Holloway, is currently scheduled for 6:30 a.m. central time in room 135, building 2. Standing by for acquisition of signal through Yarragadee. This is Mission

Control Houston.

END OF TAPE

PAO Mission Control Houston. Four days, 14 hours, 8 minutes mission elapsed time. Crew has been asleep for some 2 hours now. In Mission Control, the activity is continuing with the possible changes to tomorrow's flight plan, determining what additions or changes there may be to those things that are already set out in the crew activity plan. Columbia's ground track is carrying it over the Middle East at this time, currently on orbit number 75 at 4 days, 14 hours, and 9 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Four days, 14 hours, 59 minutes mission elapsed time. Crew has been in their sleep period for about 3 hours now, and Columbia is just beginning the northward turn of the orbital ground track; will be passing over the Santiago tracking station South America in about 3-1/2 minutes on this 76th orbit of the Earth. Four days, 15 hours mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Four days, 15 hours, 7 minutes mission elapsed time on orbit number 76. Flight Director, Tommy Holloway, just completed a status check in Mission Control asking each of the systems engineers monitoring the Columbia and looking at the data they've been receiving over the Santiago station, what their status is, and what their opinion is of the condition of their respective systems and all gave a go indicating that things are still going well on Columbia. Crew is only about 3 hours into their sleep period and they're due to get up in about 4 hours and 50 minutes. At 4 days, 15 hours, 8 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston. Four days, 16 hours, 6 minutes mission elapsed time. We are on orbit number 76 in the flight. Columbia is just north of Australia. The vehicle currently is in an orbit that is about 135 nautical miles by about 126 nautical miles and the current altitude is about 131.5 nautical miles. The orbiter is currently located at latitude 4.4 south, longitude 144.2 east. Flight controllers in Mission Control are currently reviewing the suggested revisions to the crew activity planned for tomorrow, so that any changes can be made in time to send that message up to the crew on the teleprinter so that they will be, so they will have it in hand when they are scheduled to review that after their post sleep activity. Crew currently has a little less than 4 hours remaining in their sleep period. At 4 days, 16 hours, 7 minutes mission elapsed time. This is Mission Control Houston.

END OF TAPE

PAO Mission Control, Houston, 4 day, 11 hours, 55 minutes mission elapsed time. Orbit number 74, or rather orbit number 73. We are about to pass within range of the Santiago, Chile tracking station, but as the capcom Terry Hart told the crew on the last pass, this would just be a listening opportunity for us, in case they had anything to say. But we don't expect communication this time, because the crew is now into their sleep period and Colonel Lousma reported the last time that we talked to him that he and Gordon Fullerton were getting ready to retire for the evening. We are at that time of the evening where the distance between tracking stations is quite a bit of time between them. Which matters very little, as far as voice communication goes, since the crew is going to sleep at this time. 4 days, 11 hours, 56 minutes MET, this is mission contol, Houston.

PAO Mission control, Houston, 4 days, 11 hours, 59 minutes, mission elapsed time. Flight director Tommy Holloway just completed a status check with the systems engineers in the room in mission control. And all reported that their systems were functioning well. And the vehicle is configured for the night. 4 days, 11 hours, 59 minutes, mission elapsed time, this is mission control, Houston.

PAO This is mission control, Houston, at 4 days, 12 hours, 34 minutes, mission elapsed time. Some 20 seconds ago we passed the point in the flight where we exceeded on STS-3, the combined flight time for both first 2 shuttle flights. The point was at 4 days, 12 hours, 34 minutes and 3 seconds was the total flight time for both the first and second shuttle missions. And we have now surpassed that at this point in the flight of STS-3. This is mission control, Houston.

PAO Mission Control, Houston, 4 days, 13 hours, 9 minutes, mission elapsed time. We are on orbit number 74 at the present time and Columbia is out on a long low swing over the Pacific Ocean. The crew has been in their sleep period for a little over an hour now. And the vehicle has essentially been buttoned up for the night. Ground controllers here in mission control are reviewing the activities for tomorrow and preparing the teleprinter messages that will go up to the crew early in the morning, so that they'll have them when they get up and can be reviewing them after they get up in the morning. It was quite a full day again today for astronauts Lousma and Fullerton operating the remote manipulator arm in the backup mode. Checking out in that mode and continuing to gather science data. The vehicle remains in the nose to sun attitude for the thermal test and that position which is about an 80 hour long attitude to determine the effects of the differences in heating the vehicle on one end while the backside of it is exposed to the coldness of space. At 4 days 13 hours, 10 minutes, mission elapsed time, this is mission control, Houston.
END OF TAPE

PAO And we are about 32 minutes away from the next acquisition period which will be on, just on the southwest edge of the range of the Hawaii tracking station. That's another very low elevation pass. And then it will be another considerable time before we come in contact over the Santiago tracking station, and perhaps by that time the crew will already be in their sleep period. 4 days, 10 hours, 58 minutes, mission elapsed time, this is mission control, Houston.

CAPCOM Columbia Houston with you for about 3 and half minutes through Hawaii, over.

SPACECRAFT Hello there Davie, boy we wouldn't have the time of our life in the last hour, this is the first chance we've had to relax and look out the window. We've had a great tour. Go ahead, what can do for you.

CAPCOM Okay, Jack, nothing pressing, we do have some information for tomorrow for you, relative to the cap if you get a cap out, I'll anadate the first couple of days, first couple of hours for you.

SPACECRAFT Okay, got it go ahead.

CAPCOM Okay, Jack, our current plan is to give you essentially everything from wake-up through 2200 hours to do as you like with. Understand, that you would like to get some 16 mm photo time. The only activity that we do require being done, or the first 3 activities, the first 3 pilot activities on page 4-95. And we would like those activities moved to 2020 on page 4-94.

SPACECRAFT Okay, that's dual GPC interconnect and thermal soak back 2020.

CAPCOM Okay, that's correct Jack, and also that interconnect will be a left OMS interconnect. The other activity

SPACECRAFT You said the left OMS and then your going to let us out up 2200 to get some other things done.

CAPCOM That's correct, the time will be yours to do as you desire. The other activities that are on page 4-95 are, some will be deleted, some will be deferred, and that information will be in your cap update keep your hour for your reading over the morning meal.

SPACECRAFT Okay, those look like all the things we can squeeze in tomorrow or later.

CAPCOM Yeah, that's a good call Jack, and I have nothing else. I'm hear to listen if you have anything.

SPACECRAFT No, it's been a good day for us, we got a lot done and we really feel good, and we're really enjoying it and it's just great to have a little, have the hardest part behind us. And we're looking forward to the next 3 days. We're hoping the weather holds up, where we're going to land, haven't heard to much about that yet. But, we presume it's going to be good.

CAPCOM Okay, Crip just passed down to me that it's looking good for Monday.

SPACECRAFT Okay, we were looking over the clouds before, it looks like we got quite a bit left and we thought maybe you'd leave us up here for another week or so.

CAPCOM That may be in the cap tomorrow morning, you want to make sure you read the TPR.

SPACECRAFT Okay.

CAPCOM Jack, we've got 30 seconds to go here at Hawaii. Santiago is going to be a listen pass for us.

SPACECRAFT Okay, in that case, I think we'll wrap it up in the sack, we thank you guys for hanging in there and for making our plans for tomorrow and you and Tommy and the rest of the team, have a good evening, and thanks a lot.

CAPCOM Same to you Jack. See you in the morning.

SPACECRAFT Yes sir. Just getting back on the horn late here. Same for me, see you in the morning.

CAPCOM Roger, Gordo.

PAO Mission control, Houston 4 days 11 hours, 34 minutes, mission elapsed time. We just had a pass of a couple of minutes over the edge of the Hawaii tracking station there. And the crew is buttoning things down and as Jack Lousma said are preparing to hit the sack. He commented that "this has been a good day for us and we really feel good" that goes along with the results of that medical conference that the crew had with their physician earlier in the orbit, when they reported that they were eating well and slept well last and were, had very felt good all day today. At 4 days, 11 hours, 34 minutes, mission elapsed time, this is mission control, Houston.

PAO Mission Control Houston, 4 days, 11 hours, 55 minutes, mission elapsed time. Orbit number 74, or rather orbit number 73. We are about to pass within range of the Santiago, Chile tracking station, but as the capcom Terry Hart told the crew on the last pass that this would just be a listening don't expect communication this time, because they crew is now into

their sleep period, and Colonel Lousma reported

END OF TAPE

CAPCOM Columbia Houston we've got less than 15 seconds to go. Relative to your comp configuration I'll have a readup for you at Indi, which is about a two minute pass if you could be by the COMM panel at that time I'll pass it to you.

SPACECRAFT Okay, welcome aboard Dave. Hello to your team.

CAPCOM Okay we're glad to be here Jack, it will be a short visit through.

SPACECRAFT You guys sure drew, straws for the bad duties don't you.

PAO Mission Control Houston, 4 days 10 hours 45 minutes, mission elapsed time. Just had a very brief pass over the outer edge of the Botswana tracking station. We should be picking up at Indian Ocean just skirting the edge of the range of Indian Ocean station in a few minutes, about 9 minutes. There's mostly preparing the configurations onboard and all the systems getting button down for the evening. And we're on orbit number 73. 4 days 10 hours 46 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, 4 days 10 hours 54 minutes mission elapsed time. Standing by for potential acquisition here just on the edge of the Indian Ocean range very low elevation pass.

CAPCOM Columbia Houston, with you at Indi. Now have your s-band configuration if your ready.

SPACECRAFT Okay we're ready.

CAPCOM Okay on panel A1, s-band PM antenna is switch electric to preamplifier to power amplifier, stand by 2, operate 2, how copy.

SPACECRAFT Okay, how long have you done it Dave.

CAPCOM Roger, check mode, STDN high, check transponder 1.

SPACECRAFT Okay the mode STDN in high and the transponder is 1.

CAPCOM Network signal processor, check data rate transmit high, check receive high.

SPACECRAFT Verified.

CAPCOM Check uplink data s-band, check coding transmit off, check receive off.

SPACECRAFT Roger, all verified.

CAPCOM Power two

SPACECRAFT Okay (garble)

CAPCOM Okay sounds good Gordo and that configuration is for your sleep time, however, we do not want you to panel command in the event of lost comm until we make com with you at a UHF station.

SPACECRAFT Okay I understand. No panel command.

CAPCOM Roger

SPACECRAFT (Garble) the transponder two downlink problem.

CAPCOM Roger Gordo. This configuration should help us recover in the event of lost com and one other message in the next 20 seconds, we'd like taperecorder 1 track select 14 and if you have time we'd like the forward light status.

SPACECRAFT Okay, (garble) on 14 is reading a monitor level of 3 with (garble) open. Forward light status is on and we were here for lower light getting a disable, hope we didn't mess up or blow a track there. We're about 5 minutes late.

CAPCOM Okay no problem Gordo, we're coming up on LOS, we'll pick you up in Hawaii in 30 minutes.

SPACECRAFT Okay we'll see you at Hawaii.

CAPCOM Rog.

PAO Mission Control Houston, 4 days 10 hours 58 minutes mission elapsed time. On that last brief pass over the Indian Ocean station we were passing up some instructions up to the crew on configuration of the com system for the sleep period tonight. The crew is due to begin their sleep period in about an hour. And we're about 32 minutes away from the next acquisition period which will be on, just on the south west edge of the range of the Hawaii tracking station. That's another very low elevation pass. And then it will be another considerable period of time before we come in contact again over the Santiago tracking station. And perhaps by that time the crew will already be in their sleep period. 4 days 10 hours 58 minutes mission elapsed time, this is Mission Control Houston.

END OF TAPE

SPACECRAFT Alright

CAPCOM And Columbia, the priority for those events is to get the water dump started first.

SPACECRAFT Okay, I'm warming up that one now.

CAPCOM Columbia, 2 minutes left in this pass, we've got a couple of other reminders for you if you have time.

SPACECRAFT Go ahead.

CAPCOM Okay, Gordo the first to come out of interconnect, before you go to sleep. And next is that your Santiago pass will be scheduled med conference.

SPACECRAFT Thank you.

CAPCOM And Columbia Houston, we're about 50 seconds LOS now. Reminder, when you do that interconnect return of the item numbers on the OMS quantity guaging. And the next pass with comm will be about an hour and half from now at Hawaii.

SPACECRAFT Okay, we got the dump going now and we understand about the software funny with quantity gauges.

CAPCOM Okay, crystal teams enjoyed working with you, and have a good night now.

SPACECRAFT It's been our pleasure and we'll see you tomorrow. Thanks a lot Steve, so long (garble).

CAPCOM Okay.

PAO This is mission control, Houston. Loss of signal at Hawaii, next station is Santiago in 19 minutes, with a scheduled medical conference. During the Hawaii pass the crew Columbia was given a go to start the water dump early, have that over with before the sleep period begins. And that pesky nitrogen leak is still with us. The crew was given a checklist change which would allow them to switch to system 1, which in turn would feed the manifold or plumbing of system 2, Bypass the leak. The next station at which we will have air to ground communications will be Hawaii in another hour and 26 minutes. Day 4, 10 hours, 3 minutes, this is mission contol, Houston.

PAO This is mission control, Houston. The change of shift briefing with the off going flight director Hal Droughon, is now estimated to begin at 8:45 p.m. CST, in the briefing room in Building 2. Approximately 15 minutes earlier than announced before. Next station where we'll have air to ground comm will be

Hawaii in about an hour and 4 minutes. This is mission control, Houston.

PAO Mission control, Houston, 4 days, 10 hours, 32 minutes, mission elapsed time on the 73 orbit. The crew just completed a private medical conference over the Santiago tracking station talking with surgeon Dr. Sam Pool, the chief of medical sciences division here at the Johnson Space Center. And this was a very good report according to Dr. Pool. The, both crew members reported that they were eating well, and both feeling fine and had had a good night's sleep last night. Over all, a very good report on the crew health. 4 days, 10 hours, 33 minutes, mission elapsed time, this is mission control, Houston.

CAPCOM Columbia, Houston, Ivory team with you through Botswana for about a minute, how do you copy?

SPACECRAFT Fine, you're loud and clear, we just discovered something. We're putting number 7 LiOH with the A and we've discovered that B hasn't been changed for a day or 2.

CAPCOM Okay, Jack, we copy that. Columbia Houston, we've got less than 15 seconds to go. Relative to your comm configuration, I'll have a readup for you at Indi, which is about a 2 minute pass, so if you could be by the COMM panel at that time, I'll pass it to you.

SPACECRAFT Okay, welcome aboard Dave, hello to your team.

CAPCOM Okay, we're glad to be here Jack.

End of tape.

SPACECRAFT Okay, we'll see you later Steve.

PAO This is Mission Control Houston. While in their evening meal, the crew of Columbia is doing the tourist bit, looking out the window at the Earth. Just going into the night side, watching the sunset, sunrise, beg your pardon, coming out on the day side on the start of orbit number 72. Currently, Columbia is in an orbit measuring 126.1 nautical miles at perigee, 135.4 nautical miles at apogee. Velocity is 25,486 feet per second. Calcualted weight of the orbiter is 218,822 pounds mass. Cabin pressure is 14.7 psi. Temperature is 84.2 Farenheit, 44% humidity. Next station in 27 minutes will be Hawaii as the crew winds down this work day, prepares for the sleep period and the orbit presesses westward off the tracking station range. We'll return in 27 minutes at day 4, 9 hours, 27 minutes elapsed time. Mission Control Houston.

PAO Mission Control Houston. We're acqusition of signal through Hawaii for the next, probably 6 or 7 minutes, as soon as the table comes up...7-1/2 minutes.

CAPCOM Columbia Houston. I got you through Hawaii for about 8 minutes. Over.

SPACECRAFT Okay. I hear you Steve. How's everything down there in Hawaii.

CAPCOM Oh, it's real nice. Got a couple of notes for you. This will be our last pass with you for the evening.

SPACECRAFT Okay.

CAPCOM Number 1, you can go ahead and start the water dump right now instead of on time. It's going to take about an hour and 15 minutes to dump that water out and this will give you a leg up for going to sleep.

SPACECRAFT Good idea.

CAPCOM The second item Jack, is that when we reconfigured your PCS to System 2 for N-2, the leak reappeared, so there is a small N-2 leak overboard out of System 2. We want to reconfigure the PCS to be on System 1 and I have the procedure for that if your ready to copy.

SPACECRAFT Go ahead. I'm right next to it.

CAPCOM Okay. It's a reference to the orbit OPS checklist to perform the PCS 1 reconfiguration on page 4-5 with a couple of additions.

SPACECRAFT Okay. I'm looking at that checklist.

CAPCOM Okay. Accomplish the PCS 1 reconfiguration as it's stated and after you do that, then add the following steps. On Panel L-2, N-2, System 2 reg inlet closed, talkback closed.

SPACECRAFT Okay.

CAPCOM Then verify N-2, System 2 supply talkback open and verify N-2, System 1 supply talkback closed. Over.

SPACECRAFT Okay. That's to verify N-2, System 2 supply open and the System 1 supply closed. Is that right?

CAPCOM That's right and the end result is you're going to be feeding N-2, System 2 with N-2 supply. Correction, you're going to be feeding N-2, System 1 from supply 2.

SPACECRAFT Okay. (garble) we configure to PCS System 1 with those modifications?

CAPCOM You can do that right now, whenever it's convenient for you Jack.

SPACECRAFT All right.

CAPCOM And the Columbia, the priority for those events is to get the water dump started first.

SPACECRAFT Okay. I'm moving up to (garble) right now

END OF TAPE

SPACECRAFT Well, you recommend that we ought to hear that?

CAPCOM Well, I think so, it says for Gordo and Jack a message from Canada through the capcom. The RMS group coordinated by the National Research Council in Canada, sends a big thank you to the crew of STS-3 for all the care shown with the Canadarm manipulator. You're skill with the robot arm has already made this mission a resounding success, and we're proud of you.

SPACECRAFT Well that's a nice compliment and we appreciate it. But all the koodoo's, the bouquets go to Gordo, so he's going to have to accept them.

SPACECRAFT Really, I was going pick a good time, and now's a good one, to compliment the people who built that arm. It couldn't have performed more exactly like they said it would, in every respect, and every time there was a little doubt about how it would operate, it actually turned out to be easier or quicker or nicer or smoother. It's a fantastic piece of machinery.

CAPCOM Well I'm sure they appreciate that compliment, Gordo, and good work today.

SPACECRAFT Hope so, we did a lot of fiarly complex routines today. And they wouldn't have been possible without the good work of the, number of people I can mention. But several in particular that put together the payload OPS, and TDRS checklist. Those things, all that hard work really paid off. There were a lot of times today when we were rushed, and charging through it as fast as we could go. And the clarity and the number of changes and revisions that. Let me assure Sally and Steve, and the other Steve, and everybody involved, that all those changes were worth the effort.

CAPCOM Okay, we'll relay that to them, thank you. We've got one more less business related question for you. When you ran EEVT sample number 7, are you sure that that was sample 7, and could it have possibly been sample 6? We knew that sample 6 did have a bad column, Jack.

SPACECRAFT Okay, it said to run sample 7 in the checklist, but we ran sample 6. We have yet to run 7 and 8.

CAPCOM Okay, that answers our question, thank you. Columbia, we're 30 seconds LOS, next is IOS in about 2 and a half minutes.

SPACECRAFT Okay, Steve.

CAPCOM Columbia Houston, I got through IOS, for 7 and a half minutes, over.

SPACECRAFT 7 and a half minutes with IOS, okay. It looks like sun coming up from behind us, and we're looking back to (garble).

CAPCOM Roger. And Columbia we see you back in a single G 2 OPS and you're clear to do the item 48.

SPACECRAFT Okay, thank you Steve.

CAPCOM Columbia Houston, about 3 minutes left in this pass, we are wondering if you ever had a chance to evaluate the wrist camera light.

SPACECRAFT I sure did, Steve. Both yesterday and today and of course we couldn't test the lower wrist camera on first light. But the light is, looks like it'd be more than adequate. It makes a considerable light, and one of the nice things about is its not like the other lights, you have to wait for them to warm up. So, it'll do the job for working on something, inspection, or simply for grappling.

CAPCOM Okay, Gordo, thank you for that input. Columbia Houston, 30 seconds LOS. We'll pick you up next at Hawaii in 30 minutes.

SPACECRAFT Okay, we'll see you later Steve.

PAO This is mission control Houston. While in their evening meal the crew of Columbia

End of tape

...Sanitago.

CAPCOM Columbia Houston through Santiago for four and one half minutes. Over.

SPACECRAFT We read you loud and clear, the berth is complete and on time. Good Burn.

CAPCOM Okay, that's good news, Jack.

SPACECRAFT And we'll be sitting at the burn attitude until 9:21.

CAPCOM Okay that correct and I have a couple of notes for you.

SPACECRAFT Okay go ahead Bruster.

CAPCOM Okay the first one is your water dump, you can dump a tank bravo to 10 percent.

SPACECRAFT Okay bravo to 10 percent. That's on the new page then.

CAPCOM And that would be at the normal dump time, Roger.

SPACECRAFT Okay we got that.

CAPCOM Okay and I have your nose sun attitude.

SPACECRAFT Okay for what time will this be?

CAPCOM Okay this time, the nose sun attitude will be to start the maneuver not earlier than 9:50 and you can start it at 9:50.

SPACECRAFT Let me see if we've got this straight, we're going to stay in this attitude until 9:50 and then go to the this one you're about to give us. Is that right.

CAPCOM No. You're going to stay in the attitude you're in in now, the burn attitude until 9:21 then you are going to maneuver to the post burn attitude that we gave you previously. Then at 9:50 you're going to go back nose sun, and I'll give you that attitude now. And Gordo you can delete any IMU work, the IMU's are performing extremely well and we don't need to do anything to them.

SPACECRAFT Okay, give us the maneuver for 9:50.

CAPCOM Okay at 9:50 then maneuver to nose sun and that's roll one zero ninered decimal seven, pitch five decimal seven, yaw two decimal five, over.

SPACECRAFT Okay, reading back, roll one zero ninered point seven, pitch five point seven, and yaw two point five.

CAPCOM That's a good readback Gordo and you can initiate two times orb rate rotation at 10:05. Over.

SPACECRAFT Okay, initate rotation at 10:05.

CAPCOM Roger and when you do change the discrete rate to zero decimal one three four and I belive that's at one three five now.

SPACECRAFT Okay we'll make it point one three four.

CAPCOM Okay that's good readback and I believe that's all we have right now.

SPACECRAFT Okay we got it.

CAPCOM Great.

CAPCOM Columbia Houston we're 30 seconds to LOS, we'll see you next through Botswana in 17 minutes.

SPACECRAFT Okay we'll see you there.

PAO Mission Control Houston. LOS at Santiago. Next station is Botswana in 15 minutes. The upcoming IMU alignment that had been in the modified flight plan at mission elapsed time of 10:05 this date has been canceled because the drifts are so slight in the platform. Jack Lousma reported that the RCS burn was completed on time. We'll be back in 14 an a half minutes in Botswana. Mission Control Houston, day 4, 8 hours 54 minutes.

PAO This is Mission Control Houston. We AOS Botswana.

CAPCOM We're AOS Botswana for 6 minutes over.

SPACECRAFT Hello there Houston. We're reading you loud and clear through Botswana.

CAPCOM Got you five by.

SPACECRAFT We'll we finally got a chace to just sit here and look out the window and that's what we're going to do for a few minutes.

CAPCOM Hey that sounds like fun. We got a letter to read you if you want to hear this as you look out the window.

SPACECRAFT Well you recommend we that we ought to hear that?

CAPCOM Well I think so, it says for Gordo and Jack, a message from Canada through the CAPCOM. The RMS group coordinated by the...

END OF TAPE

PAO This is mission control, Houston. We have acquisition at Hawaii on rev 71.

CAPCOM Columbia Houston through Hawaii for 5 minutes, over.

SPACECRAFT (garble) with you through Hawaii. We're on a maneuver almost at the 1 attitude, we'd like you to check our load in our solution please.

CAPCOM Okay, we'll look, at it. And Jack, I have a post burn attitude for you, if you're ready to copy.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, the post burn attitude is roll 28.3, pitch 137.4, yaw 320.4, over.

SPACECRAFT Okay, that's roll 28.3, pitch 137.4, and yaw 320.4, (garble) and 921 is that affirm?

CAPCOM Okay, that's affirm, 921 is the time to begin the maneuver to that attitude I just gave you, and verify the roll was 28.3?

SPACECRAFT That's affirm, 28.3.

CAPCOM Okay, fine. And once you do maneuver to this post burn attitude at 921 we'd like you to stay in that attitude until the maneuver to IMU attitude comes at 10:05, over.

SPACECRAFT Okay, I understand you don't want us to set up 2 time roll burn, you just want to wait till IMU attitude time?

CAPCOM That affirmative.

SPACECRAFT I understand.

CAPCOM And Jack, your maneuver and targets look good to us.

SPACECRAFT Okay, thank you. You still there?

CAPCOM That's affirmative.

SPACECRAFT One thing I failed to mention last night on the fire and smoke detector suppression test, when I conducted that, I took your suggestion regarding the note at the top of the page and so forth. First time we did the test a couple of days ago, the left flight deck light was late and the aft bay 3, light did not work. Last night when I did it the aft bay 3 did not work, and nor did the left flight deck light work. I sackeled the STS-

circuit breaker as the note says and with the same results.

CAPCOM Okay Jack, copy that, thanks for the information.

SPACECRAFT Sure.

CAPCOM Columbia Houston, we're 20 seconds LOS, we'll see you next at Santiago in 21 minutes.

SPACECRAFT Okay, Bruster, we'll see you at Santiago.

CAPCOM Roger.

PAO This is mission control Houston, loss of signal at Hawaii. 20 minutes to Santiago, Chile station to back up some what in the communications situation when aboard the Columbia at this time. Historical standpoint, the first indication was on day 3, 8 hours, 35 minutes, orbit number 55 over Hawaii. The low power mode of S-band transponder number 2 apparently had failed, or at least was inoperable. And 2 orbits later, orbiter 57, day 3, 11 hours 45 minutes, while in the midst of troubleshooting, the transponder number 2, both high and low modes of transponder 1 became inoperable. During the just completed pass over Hawaii, the crew reported they were in burn attitude for the RCS burn with the ignition time of 8 hours, 40 minutes, some 12 minutes from now. We should get a burn report at Santiago in 19 minutes. At day 4, 8 hours, 20 minutes, mission elapsed time, mission control, Houston.

PAO This is mission control Houston, we have acquisition of signal through Santiago.

CAPCOM Columbia Houston through Santiago for 4 and a half minutes, over.

SPACECRAFT Read you loud and clear the

END OF TAPE

PAO ...for the upcoming burn, the OMS thrusters. The next station in 33 minutes, again, is Botswana. Mission Control at day 4, 7 hours, and 2 minutes.

PAO This is Mission Control Houston. Seven hours, 9 minutes into the 4th day of STS-3. JSC Deputy Director of Flight Operations, Eugene F. Krantz, will lay out all of the current transponder situation and the options facing the flight controllers here in Mission Control for continued flight of STS-3 in about 10 minutes in Room 135, Building 2, JSC.

PAO This is Mission Control Houston. JSC Deputy Director of Flight Operations, Gene Krantz, is in route to Building 2, Room 135 to lay out all of the current situation with the S-band communications onboard Columbia and the options that fact the flight controllers over the next several days, the remainder of STS-3.

CAPCOM Columbia Houston through Botswana for 5 minutes. I have your on-orbit RCS burn pad. Over.

SPACECRAFT Okay Brewster, we'll be ready in about 5 seconds.

CAPCOM Okay. Let me know when you're ready.

SPACECRAFT I was right in the middle of a Holleywood production here.

CAPCOM Well, we hate to interrupt you.

SPACECRAFT Okay. (garble) is looking at an on-orbit RCS burn cue card.

CAPCOM Okay Jack. That sounds like the right one. I'll start at the upper left hand corner interconnect is left OMS, RCS select 4 should have an asterisk, TV roll 180, 218850, 00408, 40 3 balls plus 4 balls .2. All balls minus, 3 balls .5. Over.

SPACECRAFT Okay. I copy, interconnect left OMS RCS. Select item 4. Y to 0218850, 00408, 40 3 balls plus 4 balls .2. All balls minus, 3 balls .5.

SPACECRAFT That's a good read back and now for the burn data. Burn attitude, 328115339, 4 balls .5, 3 balls 2, plus 4 balls .49. Y is all balls then plus 3 balls .10, HA 134 and plus 126. Over.

SPACECRAFT Okay. I copy 328115339, 4 balls .5, 3 balls 2, plus 4 balls .49. All balls plus 3 balls .10, 134 by a plus 126.

CAPCOM Roger that. With a comment to trim to 0.2 feet per second all axes. Over.

SPACECRAFT Okay. That'll be trim X, Y, and Z to less than .2 all axes. Right?

CAPCOM That's affirm Jack. Another reminder, remain in the burn attitude post burn and we will pass you the next attitude a little bit after the burn. Your initiate maneuver to go to the burn attitude is as sent up on a teleprinter at 8:15 and you have the rest of the information.

SPACECRAFT Okay. I understand. Thank you Brewster.

CAPCOM You bet.

CAPCOM Columbia Houston. A note also, they'll be no recorders required for this maneuver.

SPACECRAFT They'll be no recorders.

CAPCOM And we're 30 seconds LOS. We'll see you in next in IOS for a very short pass in about 7 minutes.

SPACECRAFT Okay.

CAPCOM Columbia Houston through Indian Ocean for about a minute.

SPACECRAFT (garble) the beautiful Space Shuttle.

CAPCOM Okay. We're reading you (garble).

SPACECRAFT (garble)

CAPCOM Columbia, there's a kind of an echo and we couldn't read you.

SPACECRAFT I was just giving my regards to the base commander, (garble) if he's still there. I'm not sure, maybe his tour is up yet though.

CAPCOM Oh, okay. We copy now and we'll be going LOS shortly. We'll see you next at Hawaii in about 30 minutes.

SPACECRAFT All right.

CAPCOM Have a nice trip.

PAO This is Mission Control Houston. We have acquisition at Hawaii on REV 71.

END OF TAPE

CAPCOM Botswana in about 28 minutes, it's a very short pass, if we miss you there, we'll see in an hour at Guam, over.

SPACECRAFT Alright, we'll go for berth and we'll see ya later, thank you Steve.

CAPCOM Ok.

PAO This is Mission Control Houston at day 4, 5 hours, 40 minutes elapsed time, 22 minutes from acquisition through Botswana; voice relay station. The crew of Columbia at this time is preparing to reberth the plasma diagnostic package, and to stow the remote manipulator system for the evening. To go back over again, the current status of the S-band system, the S-band downlink situation is unchanged, there is no output in downlink from transponder one in either high or low mode. No output from transponder number two in the low mode. However, the high is still working. Weather outlook for tomorrow at Northrup is rather lousy, so the people here in the control center during the night will look at all of the options available on dumping data at one site and managing the data through recorded on the ground kinds of situations. We'll be back in 20 minutes at Botswana, Mission Control Houston at 4 hours, 4 days, 5 hours, 41.

CAPCOM Columbia, Houston on a short pass through Botswana for one minute, over.

SPACECRAFT Ok Steve, one quick question, Is start time for this wake search as printed there as 0603?

CAPCOM That's affirmative Gordo, go on time.

SPACECRAFT Ok, I'll have to do that, I wasn't we'd updated that or not.

CAPCOM We're 15 seconds LOS, we'll see you next at Guam in about a half hour.

SPACECRAFT Ok, I'm looking at message 31G, but I don't have in my hot little hands message 40 at this time, I have a 40 alpha, you meant 40 though right?

CAPCOM Probably was 40 alpha, Jack.

SPACECRAFT Ok, that had to do with PDRS ops checklist updated in auto capture release.

CAPCOM That's affirm.

SPACECRAFT Allright.

PAO This is Mission Control, we have acquisition

through Guam.

CAPCOM Columbia, Houston, through Guam for 3 minutes, over.

SPACECRAFT Ok Steve, we're with you, just setting the old PDP in that slot there, and I did it again, I got A and C, but not B yet, I'm going to do a little catchup, but that catches the B microswitch.

CAPCOM Copy.

SPACECRAFT Ok, just simplicity itself, I did a little pitchup and (garble) watch it make the B microswitch gray or 3 gray.

CAPCOM Ok, good show Gordo.

SPACECRAFT Takes about three or four minutes is all.

CAPCOM You're getting too good at this.

CAPCOM Columbia, Houston, we're at 30 seconds LOS now, we'll pick you up at Buckhorn in 18 minutes, over.

SPACECRAFT 10-4 on the quick trip across the Pacific.

PAO This is Mission Control Houston, LOS through Guam. The crew has confirmed that the RMS (Remote Manipulator System) is being stowed, and as a matter of fact, here in the control center they got confirmation that the latches on the hold down fixtures had been cycled, we're 16 minutes away from the final stateside pass of the evening, one small slice out of Buckhorn as the ground track on orbit 70 goes offshore of the west coast of U.S. and Mexico. Back at that time, this is Mission Control Houston.

END OF TAPE

CAPCOM Columbia, Houston through the states for 15 minutes, over.

SPACECRAFT Okay, we're just cranking up the FPEG for manual search. We happened to notice that the way we're laying in it the magnetic field is right along the X axis right now, so it might be kind of hard to find the beam.

CAPCOM Copy that on the X axis. I do have some note we need to get to you during the stateside pass, but there's 14 minutes, so we'll do them at your convenience.

SPACECRAFT Okay, let us then finish this run.

CAPCOM Roger.

SPACECRAFT Steve, this (garble) magnetic field may be just covering the beam right out of end of structure or something. We're having trouble finding it at all. Take that back. Now up to 28.

CAPCOM Okay.

SPACECRAFT We went out of it very sharply. It dropped from 28 to 2 and going back into it.

CAPCOM That must be it. Payload says you guys are doing outstanding.

SPACECRAFT You got room for 50 spacemen, 50

CAPCOM Payloads says you're getting that thing right down the middle, your're almost as good as an auto system.

SPACECRAFT Okay, he got one kilovolt up to 7 4. That's better than any auto system goes so far.

CAPCOM We'll buy that.

SPACECRAFT Out over the port wing now is where the maximum was and I'm going aft till we drop out of it.

CAPCOM Roger. Just for your information, auto was getting the low 40's and 50's and you're up around 72 to 74, so your score's a little better there. Columbia Houston, you didn't hear me before the auto system was getting scores in the 40's and 50's and you're right up there in the 70's so you doing pretty good.

SPACECRAFT Okay. We kind of lost it, now we're feeling around again. Looks like it ought to be up toward the tail there. We're going to make a side to side sweep and see if we can catch it again.

CAPCOM Roger, 5 minutes left in this pass, so there are a couple of notes I do need to get to you. This is our last chance before the activity.

SPACECRAFT Okay, Steve, go ahead please.

CAPCOM Okay, Jack, when you berth a PDP which is coming up at 6 hours and 20 minutes, the request is that you cradle the RMS in the backup mode. If you cannot accomplish that before 7 hours and 10 minutes, request you go back to the primary power and complete the cradle in the single mode only if you need to do that to get it done by 7:10, over.

SPACECRAFT Okay, do a backup cradle if we can get it done by 7 10, right?

CAPCOM That's a good read back. Secondly, we sent you up a message 40 alpha which changed we changed the message from end effector mode to orbiter unloaded mode because of the end effector camera being out, but we forgot to change THC from out to THC up when you release the PDP, so you might make that change to you procedures to THC up when you release the PDP, over.

SPACECRAFT Okay, we know that one, okay thank you Steve. Any more?

CAPCOM Couple things, a reminder to review 2 messages, 31 golf, which is the upcoming RCS burn and message 42, which discusses a slight change to your RCS OMS press enable item numbers.

SPACECRAFT We'll take another look at them. 25

CAPCOM Okay, and if you have any questions we'll discuss them with you. The we'll update you preliminary set of pads at about 6 hours and 50 minutes and the last thing we need you to do is cycle the Y star tracker shutter again please.

SPACECRAFT Okay, 14.

CAPCOM Columbia Houston, we're about 1 minute LOS. You are go for the PDP berthing, the next will be Botswana in about 28 minutes. It's a very short pass. If we miss you there we'll see you in an hour at Guam, over.

SPACECRAFT Alright, we'll go for berth and see you later. Thank you, Steve.

CAPCOM Okay.

END OF TAPE

CAPCOM Okay, Jack it's uh four hours, 55 minutes, 44 seconds, over.

SPACECRAFT Ok, it's going to be 04:55:44, is that correct?

CAPCOM That's affirmative, and your roll attitude from what you said look's pretty good to us and that little tweak on the rate will help keep in shape.

SPACECRAFT Ok, well I was (garble)

CAPCOM And Columbia Houston we're LOS see you next at Guam.

SPACECRAFT Ok, Brewster.

PAO This is Mission Control Houston, LOS, Yarragadee and we're six minutes and a half away from Hawaii. During the end of orbit 68, and we'll start 69 now they've gone crossing the equator. At 4 days, 4 hours, 51 minutes, Mission Control Houston.

PAO This is Mission Control Houston, 15 minutes til acquisition at Guam, 15 seconds that is, instead of minutes, Guam seems to have sneaked in between Yarragadee and Hawaii from the last pass, and we have about a 7 minute pass over....

CAPCOM Columbia Houston through Guam for 7 minutes, over.

SPACECRAFT See we got you in Guam, Brewster, we'll run up and start another one of these searches.

CAPCOM Roger.

SPACECRAFT Ok, our little magnet (garble) the magnetic field is directly to the Z-axis to the spacecraft, Brewster.

CAPCOM Ok, we copy Z-axis.

SPACECRAFT So, I guess I was worried for nothing. And, we came through the ascending node 8 degrees off, we're at 98, instead of 90 on inertial yaw and roll.

CAPCOM Ok. And Jack, our data now shows you're just 5 degrees off on roll and that's no problem.

SPACECRAFT Ok, thank you, well he's....

CAPCOM And you're converging.

SPACECRAFT Ok. And Richard, what was the longitude of that last ascending node?

CAPCOM Standby one. Columbia, Houston we're 45 seconds LOS. Looks like the longitude of the last ascending node was 129 degrees 53 minutes east.

SPACECRAFT Okay, so, that's very close to what we got in the book.

CAPCOM That's affirm.

SPACECRAFT I was wondering where we'd get some coverage, my little slider map shows that they should pass to far north of Hawaii.

CAPCOM That's the way it looks to us Jack, and we're 10 seconds LOS, we expect to pick you up next at your Buckhorn in about 15 minutes.

SPACECRAFT See you later.

CAPCOM Roger.

PAO This is Mission Control Houston, we've had loss of signal a couple of minutes ago, actually through Guam, 11 minutes away from the States. The current status of the S-band transponder downlink problem has not changed at all, there's no output from transponder number one in either the high or low mode. And there's no output from transponder number two in the low mode. Now, the high part of that transponder is still operational and is giving no problems, we'll be back in 11 minutes for stateside pass at day 4, 5 hours, 9 minutes, Mission Control Houston.

CAPCOM Columbia, Houston through the States for 15 minutes, over.

SPACECRAFT Ok, we're cranking up the S-Mags for a manual search and we happened to notice that the way we're laying it, the magnetic field is rough along the X-axis right now, so it might be kind of hard to find the beam.

CAPCOM Copy that on the X-axis, I do have some notes we need to get to you during the stateside pass, but.....

END OF TAPE

SPACECRAFT The column temperature's a lot lower than I thought for the other samples I did, before it was right around 10, 11 degrees and now it's -7 degrees, I guess which is good but just log it because it's different.

CAPCOM Okay, we copy that. We're going LOS and we'll see you at Botswana in 8 minutes.

SPACECRAFT Yes sir.

CAPCOM Columbia, Houston through Botswana for 2 and 1/2 minutes.

SPACECRAFT Okay, we got you at Botswana.

CAPCOM Roger, your 5 by Jack.

SPACECRAFT Okay Brewster, I've started the electrophoresis experiment sample 5 and I noticed the column temperature is -5 to 6 degrees and it's been right around there every since we started, my guess is there's something wrong with the sensor, but I will go through the back up procedure if the people want me to.

CAPCOM Okay Jack, we'll check into that and in the mean time could we get a radio check from Gordo?

SPACECRAFT I'm still here, I haven't got anywhere, 1,2,3,4,5,4,3,2,1 go ahead.

CAPCOM Okay, that's fine Gordo. We're reading you on UHF this time, the last pass we weren't reading you.

SPACECRAFT I didn't make any changes.

CAPCOM Okay, that's fine, thank you.

SPACECRAFT the column temp before we went into the freeze cycle was reading almost what it is right now. And right now we're supposed to check it to be between 12 and 15 however it's down around -5 or -6.

CAPCOM Okay Jack, we're looking into it. Jack, the payload folks would like you to check the tango echo on the EVT and give us that.

SPACECRAFT That is +11, plus one one.

CAPCOM Okay we copy, plus one one. And we're 15 seconds LOS we'll see you next through Yarragadee in 16 minutes.

SPACECRAFT Okay, the question is, do they want me to stop and do the emergency procedure or let it run?

CAPCOM Stand by one. Continue to run Jack.

SPACECRAFT I'll let it run.

CAPCOM Roger that.

PAO This is Mission Control Houston. Should be acquiring now through Yarragadee, Australia final pass of the afternoon, for a total of about 4 minutes.

CAPCOM Columbia, Houston through Yarragadee for 4 minutes, over.

SPACECRAFT Okay, we got you at Yarragade, I've noticed using our little magnet that the magnetic field doesn't seem to be pointing as close to the -Z axis as it ought to for the last few passes and I'm kind of wondering if we got the right roll angle in. I looked at my chart, and it looks like we're a little bit off, I'd like you to confirm that and if we need to tweak it why, let me know.

CAPCOM Okay, stand by.

SPACECRAFT And at 4:47, I'll give you a mark on that roll angle. Okay, right now roll angle is 169, 168 mark.

CAPCOM Okay, we copied that.

SPACECRAFT It's looking better now, looks like the main area field's about 45 degrees I guess between the -X and -Z.

CAPCOM Okay, copy.

SPACECRAFT Okay, but I would like you to take a close look at this so that we can make sure we do this last set right.

CAPCOM Roger, we're working on it. And Jack, we'd like to have you make a change in the DAP for us.

SPACECRAFT Alright.

CAPCOM Okay, it'll be for the A4 DAP, rotation discrete rate vernier, we'd like you to change it from .134 to.135, over.

SPACECRAFT (garble) And do you have the exact time of ascending node here in this pass?

CAPCOM Stand by one.

CAPCOM Okay Jack, it's 4 hours 55 minutes 44 seconds, over.

SPACECRAFT Okay that's going to be 4 55 44, is that correct?

CAPCOM That's affirmative and your roll attitude from what you said, looks pretty good to us, and that little tweak on the rate will help keep it in shape.

END OF TAPE

CAPCOM Columbia Houston, we're 50 seconds LOS. Next pass through Ascension in about 13 minutes and, Gordo, we heard from Marie and she copied your comments.

SPACECRAFT Okay, thanks a lot. If I've got the day right here, I believe Andy has his Little League tryouts tomorrow and if you could wish him good luck on those.

CAPCOM Okay, we'll be sure to pass that along.

PAO This is Mission Control Houston. Loss of signal through Bermuda. 11 minutes away from reacquisition through Ascension Island. During the stateside pass there the crew of Columbia reported that the water separator bags worked just fine and gave credit to astronaut physician Dr. Bill Thornton for this innovation. They're also planning to use Bill Thornton's treadmill later on for exercise. Thornton developed this treadmill using a teflon sheet for use in Skylab and it's been upgraded and updated for the mid deck of Orbiter. 10 minutes away from reacquisition through Ascension Island at day 4, 4 hours 5 minutes 10 seconds Mission Control Houston.

CAPCOM Columbia Houston through Ascension for 3 minutes.

SPACECRAFT Hey, Brewster, howdy do.

CAPCOM Reading you five by.

SPACECRAFT Hey, Brewster, just now because it's getting a little warm in this cabin, I pinned the cabin temp controller in full cool.

CAPCOM Okay, we copy that, Jack.

SPACECRAFT One other thing, since I was a little delinquent in taking care of the PGU folks yesterday I'll make up for it today by reading the temperatures that we just took, Okay?

CAPCOM We're ready to copy.

SPACECRAFT Okay, Gordo took these, I shouldn't say I did but I'll read them to you. It was done at 4 days 4 hours. About 17 minutes ago and all the lights are OK. And chambers temperature number 7 starting with that one was 27.2, 27.4, 27.3, 27.6, 28.1, 28.4.

CAPCOM Okay, Jack, we got all of those, thank you very much.

SPACECRAFT Okay, now those folks ought to be happy for awhile and they can go out and hoe in their garden a little bit. I know

you know what that means being a farm boy.

CAPCOM You bet and Jack, could you confirm that air to air is in TR, we're not seeing any UHF down.

SPACECRAFT Ah, Gordo says it is, I'm down here working electrophoresis. He says it is though. We're upstairs, Brewster, an we're both air to air TR, how about me? Am I coming down?

CAPCOM Gordo, could you give us a short count again, please.

SPACECRAFT Okay. PLT 1 2 3 4 5 4 3 2 1, go ahead.

CAPCOM We don't seem to be receiving you on UHF, Jack, could you give us a short count.

SPACECRAFT Alright, Jack will give you a short count. 1 2 3 4 5 4 3 2 1 short count out, how do you read?

CAPCOM Okay, Jack, we're reading you on UHF.

SPACECRAFT And is the OPS recording running now or have you shut that down?

CAPCOM The recorder is running. We're in playback right now. We're still not recording any voice.

SPACECRAFT Okay. And in cranking up this electrophoresis. I noticed that the in the initial phase here during the 10 minute thaw period the column temperature's a lot lower than I thought for the other samples I did. Before it was right around 10 11 degrees and now it's a minus 7 degrees, I guess, which is good, but just log it because it's different.

CAPCOM Okay, we copy that. We're going LOS and we'll see you at Botswana in 8 minutes.

SPACECRAFT Yes sir.

END OF TAPE

SPACECRAFT FPEG sequences.

CAPCOM Okay Jack, the first one of the runs for the afternoon will be at 4 days 4 hours 40 minutes, it'll be sequence 8 followed by 9 with no VTR required.

SPACECRAFT Okay, I got it, 4:40

CAPCOM Roger, the next one will be at 5 hours even, and sequence 9 followed by 8 with no VTR.

SPACECRAFT Okay right at 5 hours 9, 8 and no.

CAPCOM And next one will be 5 hours 20 minutes, and on this one we would like you to do manual search for the beam and we would like you to take VTR.

SPACECRAFT Okay, at 05:20 manual and yes.

CAPCOM And the last one will be at 5:45, another manual search with no VTR required.

SPACECRAFT Okay, 5:45 manual and no.

CAPCOM That's good read back.

SPACECRAFT And by the way, the little experiment with Bill Thorton's air water separator worked just fine, we used the bag that had the colored, the strawberry color in it, and slung it around a few times and all the water went to the drinking end, and all the air went to the opposite end so it looks like Bills' little invention is one that really works and our hats are off to him.

CAPCOM Well that's good news, and we'll pass the word along.

SPACECRAFT Brewster, you're one of my neighbors over there in Friendswood, I wish you'd relay to Loren Wood and the Mayor there and all of our mutual friends and neighbors how much I really appreciate them thinking about me and my family during this flight.

CAPCOM I'll be glad to do that Jack.

SPACECRAFT Brewster does this pass go any where near Houston?

CAPCOM No, it doesn't it goes quite a bit to the North.

SPACECRAFT Okay next time around, maybe huh?

CAPCOM It turns out the next rev is a bit to the south, we kind of bracket it this time.

SPACECRAFT Okay, what kind of day is it outside?

CAPCOM I wish I knew, I'm told it's kind of partly cloudy a little cool front came through last night and cooled it down nicely and it's not too bad a day.

SPACECRAFT Okay. You can tell Bill Thorton also, that although we haven't gotten to his treadmill yet cause we haven't felt too much like it, and been too busy, that we're planning to give it a try.

CAPCOM Okay, we'll do that. And Jack and Gordo, we ran into Gratia and Marie both in Building 30 here yesterday, and after they witnessed and heard of your big pick up of pace and you're feeling better and getting plenty of sleep and rest they were all smiles and really enthusiastic about the great job you guys are doing and really looking forward to hearing all about it from you in person.

SPACECRAFT Well great, I'm glad to hear that, You need the right kind of people standing behind you for that. And I think we've got them.

SPACECRAFT I'll say that. It's lonesome up here but we'll be back this Monday and tell them all about it.

CAPCOM Okay, we'll pass that along, and I know they're looking forward to it.

SPACECRAFT Sure is nice to have someone holding the fort down when your gone and off doing these kind of things.

SPACECRAFT Well I have to be home Monday, cause I'm running out of clean underwear.

CAPCOM Well I bet she'd say not to bring home any dirty. And Columbia, Houston it seems like everytime we go through a sunrise terminator the Y tracker shutter closes so we'd like to have you cycle it open for us again, and if you catch it doing that next time we get that sunrise terminator you can just go ahead and cycle it.

SPACECRAFT Okay.

CAPCOM Columbia, Houston we're 50 seconds LOS, next pass through Ascension in about 13 minutes and Gordo we heard from Marie and she copied your comments.

SPACECRAFT Okay thanks a lot.

END OF TAPE

CAPCOM Okay, thanks a lot.

SPACECRAFT Steve, all during this last sequence according to our magnet indicator here, the magnetic field was lying almost along the X axis, just back toward the tail but just a little bit maybe 10 degrees above being straight back along minus X.

CAPCOM Copy that, 10 degrees above the X axis.

SPACECRAFT Still there, Steve?

CAPCOM We're with you with 3 minutes to go, Gordo.

SPACECRAFT Okay, one thing I have noticed here is every now and then when I'm recording on the VTR I see no video light and yesterday or the day before I noticed it and checked it and I am right now. I noticed it flashes red occasionally and no video light at the end of this operation and it had gone back out again. I rewound some tape and am playing it back to myself and looks like it's getting a good picture so evidentally I'm getting a false light there occasionally and I don't know why, but hopefully that's all it is.

CAPCOM Okay, thanks for that input and the answer on your FPEG start times is we'd like to get those to you probably over the states and that will be in plenty of times to start those afternoon runs.

SPACECRAFT Okay.

CAPCOM And Columbia Houston, were you able to see the FPEG beam during the night passes?

SPACECRAFT No, because to monitor the arm adequately we got to have the lights on out there and also, of course, to get any VTR, so that wipes out any chance to see it.

CAPCOM Okay, thank you.

SPACECRAFT Tell you something that's interesting though. When the lights aren't on back there and the vernier jets are firing, if they go out to the side you can see the plume but if they don't if they fire down all you can see is kind of an orange glow that I can see right now that just sort of lights up around the OMS pod and around the rudder and just glows there while those jets are firing and it's very, very spectacular.

CAPCOM That sounds pretty, we're 30 seconds LOS and next will be Hawaii in about 19 minutes, Jack.

SPACECRAFT Okay, how long before you're going to be done with the PRCS soak back test so I can go to low sample?

CAPCOM Wait one. And Jack, that's coming up in a MET of 3 hours and 30 minutes.

SPACECRAFT I'll do it on time.

CAPCOM Roger.

PAO This is Mission Control Houston. Loss of signal at Yarragadee, Australia. Up coming in 18 minutes will be Hawaii at which time we we'll return. This is Mission Control at day 4 3 hours 18 minutes 35 seconds into the flight of STS-3. Mission Control Houston. 10 minutes, 10 seconds away from acquistion through the station at Hawaii. Beginning of revolution 68, orbit 68, and 5 minutes of tracking here at Hawaii. A brief dropout and pickup at stateside.

CAPCOM Columbia Houston through Hawaii for 5 minutes, over.

SPACECRAFT Okay, we got you through Hawaii, we're doing a VTR demonstration of the Bill Thorton water valve. Water gas valve.

CAPCOM Okay, sounds fine and whenever you get ready on this pass, or the states I have the next FPEG start times for you.

SPACECRAFT Okay, we'll probably wait till the states, Brewster, we're also eating at this time.

CAPCOM Okay, and enjoy you lunch.

SPACECRAFT Thank you.

CAPCOM Columbia Houston, we're 20 seconds LOS. See you over the states in 4 minutes.

SPACECRAFT Okay.

CAPCOM Columbia Houston, over the states for 16 minutes.

SPACECRAFT Okay, Brewster, we're down here chewing our lunch but go ahead and give me those times for the next FPEG sequence.

END OF TAPE

CAPCOM And Poc appreciates that information, Jack, thanks. Columbia, Houston, Jack if you do have a free moment here before this LOS we got a procedure that you could work at your convenience during any meal period to look for the gas bubbles in the water and try to determine the source of those.

SPACECRAFT Stand by. Actually Steve, we don't have too many bubbles in the water now, most of the air got out of the system I guess.

CAPCOM Okay Jack, let's just delay that for now. Columbia, Houston, we're 30 seconds to LOS, next is Botswana in 4 minutes and we sent up a teleprinter message on this pass, you might look for it.

SPACECRAFT Okay.

PAO This is Shuttle Control, Ascension Island has loss of signal with Columbia. Next acquisition through Botswana in 4 minutes. At 4 days 2 hours 47 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 4 days 2 hours 50 minutes mission elapsed time. Shuttle coming up on acquisition through Botswana on orbit number 67.

CAPCOM Columbia, Houston through Botswana for 6 minutes, over.

SPACECRAFT Through Botswana and we're reading your message.

CAPCOM Okay, we thought it might of been garbled in transmission, I guess it came up alright.

SPACECRAFT Yep, You there Steve?

CAPCOM We're still with you Jack.

SPACECRAFT Okay, what are those items that Bill Thorton build for separating the bubbles out of water? You know that messy little valve that he made, where are they stowed?

CAPCOM It should be stowed in MF43K Jack, for the air separator.

SPACECRAFT Yes, where did you say? I didn't get the whole number.

CAPCOM That's Mike Foxtrot 43 Kilo.

SPACECRAFT IFM tools, okay.

CAPCOM And Columbia, Houston, we're 30 seconds to LOS now. Next is Yarragadee in 13 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control, Botswana has loss of signal. Columbia now heading out over the Indian Ocean toward Australia where the Yarragadee station will pick it up in 12 and 1/2 minutes. At 4 days 2 hours 58 minutes mission elapsed time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston through Yarragadee for 7 minutes, over.

SPACECRAFT Okay, we're hearing you friend at Yarragadee. Steve, I think we're going to do some more of this joint operations after lunch, you got any times yet?

CAPCOM We'll work on it Jack, I'll get back to you with those.

SPACECRAFT Okay, and am I correct in thinking that today is the end of all the arm operations? Are we going to have some tomorrow?

CAPCOM We believe your right Jack, and we'll double check it.

SPACECRAFT Not that we're in a hurry, it's fun to do. I'm just trying to allocate my film properly.

CAPCOM We understand, while your waiting around you might be interested to know the good people in Friendswood are putting up one America flag for each day of your mission, in Stevenson Park, you stay up too long and they're going to run out of room in the park for flags.

SPACECRAFT Well I'll take this opportunity to say hello to all my good friends and neighbors there in Friendswood, I appreciate their thought and I know that they're giving my family a lot of support and a lot of encouragement to all of us and just want to thank them for their prayers and for the good wishes cause they're flying with me and I know their working. And just, my best regards to everybody in Friendswood and look forward to getting home.

CAPCOM Okay, thanks a lot.

END OF TAPE

PAO ...at 4 days 1 hour 47 minutes Mission Elapsed Time, this is Shuttle Control Houston.

CAPCOM We have every assurance it will be good on Monday.

SPACECRAFT It will be good on Monday.

SPACECRAFT No problem Steve, it's an all weather Air Force.

CAPCOM That's right.

SPACECRAFT I see Edwards right by the elbow joint of the arm right now.

CAPCOM Oh that's great. We've got a couple of more switches for S band troubleshooting on C3 if one of you is free we need S band PM controlled to panel.

SPACECRAFT Okay you're in panel.

CAPCOM Okay Jack. Back on panel A1 S band EM transponder to 1. Over.

SPACECRAFT S band EM transponder is in 1.

CAPCOM Okay that's all for now. Thank you.

CAPCOM Columbia, Houston. A last step here. We're on panel C3 again. The S band EM control back to command please.

SPACECRAFT Okay you're back in command Steve.

CAPCOM Thank you.

SPACECRAFT Yes Sir.

SPACECRAFT Just had another high voltage trip off.

CAPCOM Copy.

CAPCOM Columbia, Houston. We may lose you here for about a minute.

SPACECRAFT All right.

CAPCOM Columbia, Houston. 10 minutes left in this pass. At your convenience we need the Y star tracker shutter cycled. Over.

SPACECRAFT All right.

SPACECRAFT Just crossing the Mississippi Steve.

CAPCOM Roger.

PAO This is Shuttle Control. We're back in the pretest communications configuration aboard Columbia. INCO has not yet reported on the results of his test. We will give that to you as soon as it's available. Still another 7 minutes 45 seconds left in this pass.

SPACECRAFT And I see Steve that we're flying directly over Marine Corp. air station at Cherry Point, North Carolina, the home of a number of famous Marine aviators.

CAPCOM Roger.

SPACECRAFT Yeah, both of them live there.

SPACECRAFT I won't even dignify that with a reply.

PAO This is Shuttle Control. The initial troubleshooting of the communications problem was not successful. We will continue to test and troubleshoot that system during the day. Still 2 minutes to go before Bermuda loss of signal we'll standby.

CAPCOM Columbia, Houston. 30 seconds LOS we see you warming up lunch and next is DAKAR at 5 minutes.

SPACECRAFT We can't keep anything from you guys, can we?

PAO This is Shuttle Control. Columbia out of range at Bermuda. DAKAR and with an overlapping coverage at Ascension is next in 4 minutes. INCO was unsuccessful in his troubleshooting activities over this United States pass an attempt to come up with a fix for the communications system. He'll continue testing and troubleshooting. We're now back in the configuration that was active prior to the test. At 4 days 2 hours 32 minutes Mission Elapsed Time. This is Shuttle Control Houston.

END OF TAPE

PAO This is Shuttle Control at 4 days 2 hours 1 minutes Mission Elapsed Time. Standing by for acquisition at Hawaii.

CAPCOM Columbia, Houston through Hawaii for 7 minutes. Over.

SPACECRAFT Okay we're in second half of this first beam search.

CAPCOM Roger.

CAPCOM Columbia, Houston. At a convenient time inbetween your runs, you have a couple of switches to troubleshoot the small N2 leak and to continue troubleshooting the S band.

SPACECRAFT Okay go ahead with the S band.

CAPCOM Okay Jack if you're at the back on panel A1, we need network signal processor power to 1.

SPACECRAFT I didn't catch that. Where is that located.

CAPCOM On panel A1L NSP power to 1 over.

SPACECRAFT Okay you cut out, NSP what?

CAPCOM NSP power verify set to number 1.

SPACECRAFT NSP power verified number 1.

CAPCOM Jack that's all on the S band troubleshooting for now. The N2 system we have a couple of switches on panel L2 up at the front over.

SPACECRAFT I'm there go ahead.

CAPCOM Roger on panel L2, N2 system 1 and 2 reginlets close. Over.

SPACECRAFT Okay you want to close the reginlets on both N2 systems 1 and 2.

CAPCOM That's affirm and we'll be seeing if that leak is in the manifold. Just leave it as is for ...

SPACECRAFT How do you like that. Take a look at that.

CAPCOM Configuration looks good Jack.

SPACECRAFT Okay something about the DACs I'm not getting any end of film light so it's pretty hard to tell when they're not working.

CAPCOM Copy.

PAO This is Shuttle Control. Steve Nagel is CAPCOM during this pass.

CAPCOM Columbia, Houston continuing the S band troubleshooting we would like a panel then command. This should do nothing to our COMM here, however, over the states INCOs going to be commanding from the ground and we may have some data dropouts over.

SPACECRAFT Okay you want a panel command right now.

CAPCOM That's affirm. Right now.

SPACECRAFT Okay you got it.

CAPCOM Thank you.

CAPCOM Columbia, we're 30 seconds LOS. Next is the states in 3 minutes.

SPACECRAFT Okay we find that it's about every run we have to reset this PDP high voltage. We're doing it though as you said on the message.

CAPCOM Okay we copy.

PAO This is Shuttle Control. Columbia out of range at Hawaii moving toward the coast of California. Buckhorn station should have Columbia in a minute 45 seconds. Gordon Fullerton now conducting the second half of this joint beam search. Mission Elapsed Time is 4 days 2 hours 10 minutes. We'll standby for acquisition through Buckhorn.

PAO Shuttle Control ECOM will be conducting communications checks and some checkouts of communications systems from the ground. We may have some data dropouts, some communications dropouts and we may go to UHF voice during some of these passes.

CAPCOM Columbia, Houston. Got you through the states for about 20 minutes over.

SPACECRAFT Okay Steve.

SPACECRAFT High voltage fell off again. I'm recycling.

CAPCOM Copy.

SPACECRAFT Just coming across the coast Steve. Pretty cloudy out here.

CAPCOM Roger.

CAPCOM We have every assurance it will be good on Monday.

END OF TAPE

PAO expressed. That blue means exterior and with an ASA of 64 and the decal that says interior on those is improper. Magazines 32 through 45, the red decaledd ones, are interior decals and they have an ASA of 400, so you're color coding is correct.

SPACECRAFT Okay, the colors are right, the words are wrong. That's good news because that's the way we've been using them.

CAPCOM Okay.

SPACECRAFT Thank you sir.

CAPCOM You bet.

SPACECRAFT The Italian I'll take. That'll be good.

CAPCOM Columbia Houston, we didn't copy that.

SPACECRAFT I'm sorry Brewster I hit the wrong button here.

CAPCOM Okay.

SPACECRAFT Just putting my lunch order in with the chef downstairs.

CAPCOM Sounds like a good idea.

SPACECRAFT We really got a short order restaurant here, Brewster, we just got so much chow and so much flexibility. There's so much we haven't eaten we're just having a ball now.

CAPCOM Well that's great, Jack, and we're fully confident that you'll take care of it all.

SPACECRAFT Gordo's the one thats putting the chow away. I don't eat too much myself but I like to keep him happy because he's doing a lot of work.

CAPCOM Well, the performance so far has been absolutely great, so whatever you're doing you're doing it right.

SPACECRAFT Well, I'll just keep his diet up. It must be something in the water.

CAPCOM And Columbia, do have an update of the ascending note times that you can use with the roll facing cue card. You would need to add 3 minutes 45 seconds to the CAP ascending note times in order to make them correct and if you don't have a chance to write that down we'll be glad to remind you later.

SPACECRAFT Okay, add 3 45 to the book ascending notes.

CAPCOM That's affirm, Gordo. Columbia Houston, we're 45 seconds LOS. Orroral Valley is next, it's a very low elevation we may not get you there and then would be Hawaii following that in 18 minutes and at Hawaii we may have a couple of switch throwings to help us again with the troubleshooting of the COMM, other than that, we see you coming up on the joint VCAP PDP beam search and that'll probably keep both of you busy for the next hour and 1/2 or so and we wish you luck with that.

SPACECRAFT Okay, Brewster, see you later.

PAO This is Shuttle Control. Columbia out of range at Yarragadee. Very short pass at Orroral on this orbit. Less than 30 seconds about 27 second pass, I'm not sure we'll have any COMM during that pass. Acquisition there at 1 minute 15 seconds from now we continue to standby in case there is any conversation. The next station that we're likely to have comm is Hawaii in 17 minutes. This is Shuttle Control. Orroral has loss of signal. Will next talk to the crew of Columbia at Hawaii in 15 and 1/2 minutes. Columbia's commander Jack Lousma is preparing starting meal preparations. Still a couple hours away from lunch for the crew but takes time to warm the food up and get it ready. He's doing those preparations now. And Gordon Fullerton is busy with a joint vehicle charging and potential and plasma diagnostic package beam search. At 4 days 1 hour 47 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

PAO Gordon Fullerton has started the wake search, he's doing the plasma diagnostic package to survey the wakes that the Columbia's making through the ionosphere. CAPCOM Brewster Shaw informed Jack Lousma that we plan to do some troubleshooting of the communications problems during the next pass over the United States about an hour from now. He'll give Lousma some switch settings over the next station pass at Botswana and then ENCO will be able to do some commanding to check out the communications systems over the states. At 4 days 1 hour 10 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Columbia Houston through Botswana for 3 minutes, over.

SPACECRAFT Okay, we're just coming up to the last plane of the wake search here.

CAPCOM Okay, copy that, .175. That's great that you got through all of that, Gordo, and you can just let it sit there at 175 until it's ready to start the next section.

SPACECRAFT Alright, that sounds like a good idea to me.

CAPCOM And Gordo, just to pass along the comment from the PDP folks back in the POC that they're extremely pleased with PDP work this morning and you're doing a great job for them, they appreciate it.

SPACECRAFT Okay, glad to be of service. It all pays the same, Brewster.

CAPCOM Yes sir. And Jack, are you would you have access to panel A1 now, or do you want to wait for that?

SPACECRAFT to A1.

CAPCOM Okay, great, we will configure all six or verify all six S-band PM switches and then one switchdown on the NSP. I'll just read them top to bottom and let you do them, you can read them back if that's alright?

SPACECRAFT Okay.

CAPCOM Okay, S-band PM antenna switch electrics verify that's in 1, then preamp to 1, power amplifier standby to 1, power amplifier operate to 1, mode stayed in high and transponder to 2, over.

SPACECRAFT That's all done just the way you said it.

CAPCOM Okay, that's great. We're 25 seconds to LOS. We'll see you next at Yarragadee in 13 minutes, thank you a lot.

SPACECRAFT Okay, Brewster.

PAO This is Shuttle Control. Botswana has loss of signal. Yarragadee is next. Yarragadee is UHF only station. Columbia will be within range there in 12 and 1/2 minutes. During this pass Gordon Fullerton was on the last part of the wake search with the PDP and we reported to him that the payloads operations control center personnel is pleased with the way that experiment is going today and the work that Fullerton is doing with it. And Jack Lousma has the switches set for the commmunications tests that will be conducted over the United States in about 46-47 minutes. At 4 days 1 hour 25 minutes mission elapsed time this is Shuttle Control Houston. This is SHuttle Control at 4 days 1 hour 36 minutes mission elapsed time. Columbia moving within range at Yarragadee.

CAPCOM Columbia Houston through Yarragadee for 6 minutes, over.

SPACECRAFT We got you.

CAPCOM We read you five by as well and the only thing we have for you on this pass is an answer to your question about the 16 millimeter magazine.

SPACECRAFT Go ahead.

CAPCOM Okay, the magazine's numbers 1 through 8 are exterior film. The blue decal is correct as you had expressed. That blue means exterior and with

END OF TAPE

PAO We'll see Columbia in about 4 minutes. Spacecraft came up at Buckhorn on this pass, Pilot Fullerton remarked that the arm was parked in front of the nose, and then a little later on in the pass he got a look at the bottom of the Plasma Diagnostics Package and said it looked like a couple of animals were painted on the bottom of the PDP. He did not identify the animals by species. Advised talking to the payload operations control center for further information on that. We'll have Dakar in just under 3 minutes. Elapsed time is 4 days 58 minutes, this is Shuttle Control Houston. This is Shuttle Control at 4 days 1 hour 1 minute. Columbia's about 5 seconds away from acquisition through Dakar.

CAPCOM Columbia, Houston through Dakar for 7 minutes, over.

SPACECRAFT Okay, we're on our way to the last point, I think we're just barely gonna make it in time to set up for the wake search, without a moment to spare.

CAPCOM Okay, that's great.

SPACECRAFT Refresh my memory, we have not done a wake search before this, is that correct? I think I need to VTR this.

CAPCOM That's correct, we have not done a wake search.

SPACECRAFT I got one for the film guys Brewster.

CAPCOM Go ahead Jack.

SPACECRAFT Okay on the 16mm film, the ones with the blue markings are supposed to be exterior and the ones with the red markings are supposed to be interior. However, I've got 4 blue marked magazines that say interior on them, and 2 of them are set aside for entry 16mm, and those 4 are labeled 4, 6, 7 and 8, I want to know what if those are interior or exterior.

CAPCOM Okay, Jack we'll try and find out for you. And Jack are you free to throw some switches on L1?

SPACECRAFT No.

CAPCOM Okay.

SPACECRAFT If we're going to get started on time, we gotta hustle here Brewster.

CAPCOM Okay, no hurry.

SPACECRAFT You there Brewster?

CAPCOM That's affirm.

SPACECRAFT Okay, what can I do for you in L2 now sir?

CAPCOM Okay, Jack it's SC or FCS test clean up on panel L1.

SPACECRAFT I'm ready.

CAPCOM Okay, Flash evap controllers, 3 of them to off.

SPACECRAFT Okay, I got them all off.

CAPCOM Roger and topping EVAP heater NOSL left and right to off, and the NOSL duct to off.

SPACECRAFT Okay the evaporators are all off and so are their heaters.

CAPCOM Okay, fine thank you.

SPACECRAFT Yes sir. Got a super view of Africa out our window now.

CAPCOM And Columbia Houston, we're ginning up a trouble shooting procedure to try and troubleshoot some of the comm problems we've had with the S-Band, and if it's convenient over Botswana I will have you reconfigure some switches on panel A1 and then when we get over the states we'll do some commanding from the ground to try and trouble shoot the problems there.

SPACECRAFT Okay, we'll help all we can, I'll be standing by the panel to do them as you say them.

CAPCOM Okay, that'll work out fine Jack, thank you. And we're 20 seconds to LOS, Botswana is next in 11 minutes.

SPACECRAFT Okay, and do the film guys have the, my question clearly stated enough?

CAPCOM I believe so, we're working it.

PAO This is Shuttle Control. Columbia moved out past the range of Dakar. Next station will be Botswana in 11 minutes. Pilot Gordon Fullerton has started the.....

END OF TAPE

CAPCOM Gordo, you may start now and complete the entire sequence.

SPACECRAFT Okay, we're going back to lower left and upper on the antennas, Ed.

CAPCOM Uh, negative, leave the antennas in GPC but just go ahead with the sequence.

SPACECRAFT Okay, you want the antennas in GPC for the rest of the sequence?

CAPCOM That's affirmative.

SPACECRAFT Alright.

CAPCOM And Gordo, the reason is this is a general EMI and is not affected by that. We can just press on in the configuration we're in.

SPACECRAFT Oh, I wished we'd known that the last time.

CAPCOM Jack, we looked at the thermal EVAP message you got and that was normal operations for switching controllers here.

SPACECRAFT Alright. I went to controller B from the controller A, the temperature went up to somewhere around 60 degrees and I noticed that it marched back down to 40 where it is now.

CAPCOM Okay, copy that.

SPACECRAFT Okay, it looks like it's pretty cloudy all over the west coast.

CAPCOM Looks like you guys will probably fly for a while longer, huh?

SPACECRAFT Say again.

CAPCOM I say it probably a good idea that you're flying a bit longer, then.

SPACECRAFT That's right. Got any weather forecasts for the White Sands for Monday?

CAPCOM We believe it's going to be good for Monday, Jack. Jack, if we could get you to cycle the wide tracker shutter please.

SPACECRAFT I did.

CAPCOM Thank you.

SPACECRAFT (garble) We're up at .131 now doing the rotation and that is about as close to the Orbiter as I would like to see that arm, I think. Looks like I can reach out this overhead window and touch the arm.

CAPCOM Yea, you probably wouldn't want to do that, Gordo. And Columbia, for your information, we are processing data through the Northrup stations at Tula Peak now and it looks good to us.

SPACECRAFT Alright. We got the 135 all the way there and check them out when they're airborne set.

CAPCOM Uh, that's affirmative, Gordo.

SPACECRAFT Guess this is the a better check than that would be

CAPCOM Yea, I believe this is the real thing.

SPACECRAFT It's coming back to 134 now right across the top of the cabin. It's really close.

CAPCOM Copy.

SPACECRAFT Some sort of strange powder on the bottom of the high frequency antenna. It's hard to tell. Looks almost like a couple of animals or something.

CAPCOM Is that right?

SPACECRAFT I think we'd better check that out with the POC and make sure that's okay.

CAPCOM Wilco. Columbia Houston, due to the 1 hour slip in launch time we'd like to sync things back up as far as day night cycle goes so we would like you to start the PDP wake search 5 minutes late. That would be at 1 hour and 5 minutes in order to get things synced back up. You will you should start the joint VCAP PDP beam search, however, on time as per the cap as well as the meal prep, over.

SPACECRAFT Okay, only change is this next item coming up is five minutes late, right?

CAPCOM That's affirmative. Columbia Houston, we're 30 seconds to LOS. Dakar is next in 5 minutes and note that we are

not recording voice at this time and we won't be until we advise you otherwise.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia has moved out over the mid Atlantic beyond the range of Bermuda. Dakar will receive Columbia in about 4 minutes

END OF TAPE

PAO Flight Director, Harold Draughon and his entry team are on now. They'll have a long shift today. Came on handover at 8 o'clock this morning and will go about 12 hours today. They'll hand over their shift at 8:30 this evening. Neil Hutchinson and the orbit team are not working today. Taking a rest after 3 very long shifts the last 3 days. So we can look forward to the next change of shift briefing somewhere on the order of 9 p.m. central standard time today. At 4 days 17 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Comm Tec CTV, you're loud and clear, how me?

SPACECRAFT Roger, you're loud and clear, are you ready for the upcoming pass?

CAPCOM Ready, standing by.

SPACECRAFT Okay, thank you.

PAO This is Shuttle Control. It's 4 days 37 minutes mission elapsed time. Columbia about to be acquired through Buckhorn.

CAPCOM Columbia, Houston, through Buckhorn for 7 minutes, over.

SPACECRAFT Okay, Brewster, we've got the arm parked out in front of the nose point 128 which is way out there and we're waiting until you're through with the (garble) band to continue.

CAPCOM Okay, and all we have for you on this pass are some FPEC start times.

SPACECRAFT Go ahead with it.

CAPCOM Okay, run number 1, 4 days 1 hour 50 minutes 8 9 yes.

SPACECRAFT Okay, got for run 1 4 slash 150 8 9 yes.

CAPCOM Okay, I'm getting a last minute correction and that should be no on the VTR.

SPACECRAFT Okay, we'll take a no on that one.

CAPCOM Okay, run number 2 is 4 days 2 hours 10 minutes 8 9 no.

SPACECRAFT 4 2 slash 4 slash 2 10 8 9 no on run 2.

CAPCOM That's correct, run 3 is 4 days 2 hours 30 minutes

8 9 no.

SPACECRAFT Run 3 4 slash 2 3 8 9 no.

CAPCOM Good read, and last one, run number 4 is 4 days 3 hours 8 9 yes.

SPACECRAFT Okay, run 4 is 4 days 3 hours on the hour and 8 9 yes.

CAPCOM That's a good read back, Jack.

SPACECRAFT Are you going to get TV together on this pass?

CAPCOM That's a negative.

SPACECRAFT When I configure the RAD control OPS temps I failed to mention that we had a thermal EVAP message quite some time ago. In fact it was at 3 slash 23 03 44 spec 88 thermal EVAP. I looked at the spec and there were a few things that set off scale low but nothing of significance at that time. You might want to look back at the data.

CAPCOM Okay, we'll do that, thank you.

SPACECRAFT Got an interesting picture looking out the overhead windows, we're upside down, trailing over lots of clouds. Black sky's in the background and the PDP is leading the whole show. It's a we've got the arm up way over the cockpit with the PDP hanging up over the nose.

CAPCOM We copy that. We wish we could see it.

SPACECRAFT How long will it be before we can press on with the sequence, Ray, do we (garble) through this entire states pass?

SPACECRAFT That's a negative, Gordo, you may start now and....

END OF TAPE

SPACECRAFT After we got the antennas back proper continued the sequence. I think we got the data but we'll have to sort that out later and get it all fixed up. The other problem then somehow doing all this we ran into a wrist roll and I had to stop and torque it all the way around, and I'm not sure that might not happen to us again here. We'll see something less of a smooth sequence but I think we're getting all the data, over.

CAPCOM Okay, we copy all that Gordo, and we don't think that's going to be a problem.

SPACECRAFT Alright

CAPCOM And I have a MET for Buckhorn station if your ready to copy that.

SPACECRAFT Right after Buckhorn.

CAPCOM Roger, it'll be 37 minutes 10 seconds, over.

SPACECRAFT Okay, at 037 10, thank you Brewster.

CAPCOM We only have one further note on this pass, it has to do with the OSS-1 tape recorder operation.

SPACECRAFT Go ahead.

CAPCOM Roger, on panel L10, switch the OSS-1 tape recorder 1, track select to 12.

SPACECRAFT Okay, it's in 12 and it's reading alpha.

CAPCOM Roger, then tape recorder 2, track select to open.

SPACECRAFT Okay, with 2 in open and 1 in 12 it reads Charlie.

CAPCOM Roger, we copy that, thank you much. And Columbia the reason for that switch was to allow the ground to monitor tape recorder 1 operations through the telemetry.

SPACECRAFT Okay, Brewster I torqued the IMUs at 235540.

CAPCOM Copy that Jack, thank you.

SPACECRAFT And how's the ol' fuel cell purge working?

CAPCOM We'll have to look at it over Orroral Jack.

SPACECRAFT Oh, I thought maybe you saw it before this.

CAPCOM What we saw Jack was that looked okay, it was in bakeout at that time, we'll look at it again over Orroral, and

we're 20 seconds LOS Orroral will be in 2 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control, Yarragadee has loss of signal, but Columbia will be within range of Orroral in 1 minute, we'll stand by.

CAPCOM Columbia, Houston through Orroral Valley for 3 minutes.

SPACECRAFT Okay, we're reading you loud and clear, we also Brewster just did the tank on the get away special and we noticed that they are procedure, it didn't say anything about waiting 10 seconds in there, and think rather 10 minutes, and we think maybe it should have. If you want us to go back and recycle, give us the procedures and we'll do that all over again.

CAPCOM Stand by one. Jack that was a good catch, we would like you to repeat that with the 10 minute delay, if you could.

SPACECRAFT Okay, can we start from where it is now and repeat it without any difficulty of, without messing up the experiment?

CAPCOM That's affirmative.

SPACECRAFT Okay, we'll try it over again.

CAPCOM Columbia, Houston 20 seconds to LOS, next pass Buckhorn in 24 minutes.

SPACECRAFT Okay.

CAPCOM See you there.

PAO This is Shuttle Control, Columbia's moved out over the Eastern coast of Australia, over the Pacific, out of range of the Orroral tracking station. Columbia on the, near the end of its' 65th orbit. Does not come within range of Hawaii on this ground track. Next station will be Buckhorn in 22 and 1/2 minutes. Most of the conversation in the Orroral pass devoted to discussion of procedures of the get-a-way special experiment.

END OF TAPE

CAPCOM Columbia, Houston through Indian Ocean, how do you read?

SPACECRAFT (garble) UH.

CAPCOM Okay, Gordo, I read you five by. I have 2 more EMI times to pass to you. Columbia, Houston, how do you read?

SPACECRAFT Houston, how do you read Columbia?

CAPCOM Columbia, Houston, read you five by, over.

SPACECRAFT Okay, we had a little mix up here in the cockpit. We switched the antenna back to GDP at the proper time but I didn't realize Jack had done that and kept on going with the sequence. We could probably figure out what point to back up to and repeat it. Why don't you check with the (garble) on that.

SPACECRAFT Wilco, and have a times for the Orroral and Buckhorn station if you're ready to copy.

SPACECRAFT You're breaking up, Ray, we didn't get your response, say again the last transmission.

CAPCOM Columbia

SPACECRAFT Houston, Columbia, we're not reading you, go ahead, please.

CAPCOM Roger, Columbia, Houston, while we're getting the answer for that, we see 2 good stars in the star table, we'd like you to go to term Idle and then torque those when you have time.

SPACECRAFT Okay, we copy that message and it looks good to me too. I'll do just like you say.

CAPCOM And Columbia Houston, we want you to press ahead with the sequence and do not back up, over. Columbia, Houston, over. Columbia, Houston, in the blind ...

SPACECRAFT Roger, to be more specific, we were probably at point 102 when we got out of the antenna configuration. Then we pressed on to 103 in GPC rather than specified lower left.

CAPCOM Roger, we want you just to continue ahead and do not go back. We'll see you at Yarragadee in 11 minutes.

SPACECRAFT I would guess to recover and get the data we had to go back to 102 and then keep going from there.

CAPCOM Columbia, Houston, in the blind. We want you to

press ahead and do not repeat the sequence.

SPACECRAFT Houston, Columbia, do you copy?

CAPCOM Columbia, Houston, roger we copy you, we want you to press ahead, do not repeat the sequence, over.

PAO This is Shuttle Control. Loss of signal at the Indian Ocean station. Next station is Yarragadee in 10 and 1/2 minutes. At 3 days 23 hours 52 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 4 days 2 minutes mission elapsed time. Columbia's approaching acquisition through the Yarragadee tracking station.

CAPCOM Columbia, Houston, through Yarragadee for 6 minutes, over.

SPACECRAFT Okay, Ray, still got you loud and clear. Anything for us? I have something for you.

CAPCOM Okay, I have a couple of notes. The first one would be the MET of enable or AOS for Orroral station. I probably should get that to you.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, it's 4 days 9 minutes 53 seconds, over.

SPACECRAFT Okay, 4 days 9 minutes and 53 seconds.

CAPCOM Okay, go ahead with your comments. Columbia Houston, go ahead with your comments.

SPACECRAFT Okay, just a second.

CAPCOM Okay.

SPACECRAFT Okay, I don't know how much of the last transmission. You were breaking up and you might have gotten there but what happened was we changed the antennas without stopping the sequence so we backed her up and started over. We back to .101 I think it was and then after we got the antennas back.....

END OF TAPE

SPACECRAFT Okay IPDP is 3 in the limit. Alright this is the second. I'll record data. 21.5, wait a minute (garble).

PAO This is Shuttle Control, Columbia out of range at Bermuda, heading toward acquisition at Madrid in 5 and 1/2 minutes. The Plasma Diagnostics Package is powered up. It's been deployed on the remote arm getting a warning of science with that experient, B-Field mapping Electromagnetic Interference search and some joint beam operations later in the day. At 3 days 23 hours 24 minutes mission elapsed time, this is Shuttle Control Houston. This is Shuttle Control at 3 days 23 hours 28 minutes, Columbia coming up on acquisition through Madrid.

CAPCOM Columbia, Houston through Madrid for 3 minutes, over.

SPACECRAFT Buenos dias.

CAPCOM Columbia, Houston for the IMUs we'd like to have a spec 21 and resume please.

SPACECRAFT Yes, I'll give that to you. Can I do the IMU alignment now?

CAPCOM We do not want to use the stars that are now, there now Jack, we will wait until we get some new stars and then use those.

SPACECRAFT Okay, I understand you want a spec 21.

CAPCOM That's affirm, spec 21 and resume and we'll wait for some new star data in the table.

SPACECRAFT Say again.

CAPCOM I say again, we will wait for some new star table data before doing an alignment.

SPACECRAFT I gotcha.

CAPCOM And Jack, on the DAP A4, we need to change the vernier discrete rate back to .134.

PAO The CAPCOM this pass is Brewster Shaw.

SPACECRAFT There you go, you got it.

CAPCOM Okay, great. Thanks a lot, a note on the PDP activities, we're a little late on getting started on the B-Field map. That general rule for the day is do as much of each event as you can get, but starting each new event on time, over.

SPACECRAFT Okay, Okay.

CAPCOM And we have one switch configuration on panel R11, when you can get ready.

SPACECRAFT Go ahead with it Brewster.

CAPCOM Okay, on R11 row E the wide band mission power to OFF, over.

SPACECRAFT Wide band mission power is coming off.

CAPCOM Okay, great and since were in a UHF uplink configuration we want to make sure that neither one of you are in VOX VOX, over.

SPACECRAFT (garble) Now we're back in PTT VOX.

CAPCOM Okay, that's a good configuration, thanks a lot. We're 20 seconds LOS, Indian Ocean will be next in 15 minutes and we haven't seen the fuel cell purge when you get a chance to do that.

SPACECRAFT Okay, we'll try to keep up, we'll get to it.

CAPCOM Okay, no rush.

SPACECRAFT (garble) right now.

PAO This is Shuttle Control, Madrid has loss of signal. Next station is the Indian Ocean station in 14 minutes. At 3 days 23 hours 32 minutes mission elapsed time this is Shuttle Control Houston.

SPACECRAFT Hello Steve, how do you read?

CAPCOM Columbia, Houston read you 5 by.

CAPCOM Columbia, Houston with you for 4 minutes, over.

END OF TAPE

SPACECRAFT One, file 16 and -388. yesterday, no change was repeatable on the position and attitude numbers, and the release time was 2318 call it. On day 3, Okay running and check brake switch vernier brakes off, front orbiter loaded, okay Steve if you're still there, we're going to maneuver up to the top of the guides right now.

CAPCOM Roger we're looking.

SPACECRAFT There she comes. This is as slow as you can ask for it. Okay and stopping at the top of the guides and I'm coming toward the front end of the ship toward me and you can watch the little flipper guides slip down as we come forward, very slowly moving forward, clearance is a little tight in there-about 2 to 3 inches is all the clearance we have toward the aft so we're moving forward to increase the (garbled). Okay, now I am completely clear and forward of the mount. I'm going to go up, we'll ease her on up.

CAPCOM And Gordo, we just lost TV, so the system is yours now, thank you for the show.

SPACECRAFT Okay, RS3 is, PDP reconfiguration cost us a lot of time, we thought we'd better stick by the checklist.

CAPCOM It looked real good and we got 3 minutes to go yet in Bermuda.

SPACECRAFT Alright. This is really a nice operating machine, it couldn't be more like the items we've trained on. If anything, it's better. Alright, I'll reset this camera. I've been trying to get this 16mm of this thing, do you read me? Okay, brakes are on, that's enough VTR for awhile, I didn't get any VTR on that piece, (garbled) get it out on the ground on that, (garble), Okay go to 5 on that (garble) IECM Mechanical power off. Mechanical power off. Now I gotta configure the PDP for ops, (garble), work through that.

CAPCOM Columbia, Houston a minute and 40 left of Bermuda, as far as your IMU alignment, you do not need to perform the maneuver, we'll take stars of opportunity whenever we get them, over.

SPACECRAFT Okay, that's good news. How do you read me Steve?

CAPCOM Gotcha 5-by Jack.

SPACECRAFT Okay, Okay I got item 3 for the REP item 23 is up. (garbled). 34 and 49 REC is a little bit out of limits but it came in yesterday at 33. Okay Gordo PDP power on call talk back gray.

CAPCOM Columbia, Houston one minute to LOS

SPACECRAFT Roger. Okay check transmitter talk back gray.

CAPCOM Columbia, Houston.

SPACECRAFT Go ahead.

CAPCOM Roger Jack, we do have the PDP EMI search AOS test times and I can give you the first one just to get you going here before we go LOS.

SPACECRAFT Go ahead.

CAPCOM It's IOS 3 days 23 hours 46 minutes and 10 seconds, over.

SPACECRAFT That is 23 46 and 10.

CAPCOM That's affirm, we're 20 seconds LOS, I'll get you the others later and we'll pick you up at Madrid next in 6 and 1/2 minutes. Thanks a lot for a good show and a reminder your in VOX.

SPACECRAFT Okay, thank you. Take it out of VOX. Okay Gordo check transmitter talk back to gray and yes it is....pressure is less than 50 PDP high voltage on talk back gray. On gray, Okay IPDP .....

END OF TAPE

and I've got a gray over here, check the receiver signal strenth. That's right on, data mode block 19, item 19, PDP turn rolling, Okay, PDP power's off, bravo's on, special 2, PDP item 4 off. Okay, (garble) should be zero. Okay, go to spec 94, please. Okay, and want item 3 block 4. Okay the brakes are coming off, and we've got to record attitude if it's different. It's let's see and we got to get over to loaded first, brakes off, over to loaded brakes on, okay the attitude is 359 9 plus 110, 98, 98 is what they were before, about like yesterday. Okay let's have check 4 for (grable), that's good, 3 gray, that's a 3 gray, the mechanical power switch on, the power switch coming on, the rig switch is the vernier checked, HTR's running and the brakes are off, for the test to limp the arm, and test mode go to 3 and release it.

(garble) 3 standby, Mark, I've got a barber pole

SPACECRAFT And if you watch real close, Steve, you can see the prerelease the prerelease. It's barely visible even from here with the naked eye. Brakes on, VTR pause, Okay, we'll let that VTR run for now. Yea, we got our photos yesterday, Okay, lets get position, Okay, reading is 1001, yesterday.....

END OF TAPE

PAO and he is Lee Briscoe on the state. We're processing Mila data now. We should have a picture shortly.

CAPCOM Columbia Houston, back with you through Mila.

SPACECRAFT Roger.

CAPCOM And Gordo, we just got TV now.

SPACECRAFT Okay, Steve, I'm goint to go down and grab the PDP. I'm just about a foot above the pin right now.

CAPCOM Roger, we're looking through camera delta. It's a good picture.

SPACECRAFT Okay, Steve, how do you read me right now.

CAPCOM Got you 5 by, Gordo.

SPACECRAFT Okay, I'm in VOX so that I can talk to you and have my hands free here. Okay, we're end effector is all and then we'll pull the capture trigger and if you watch close you'll see it grab right on there, hopefully.

CAPCOM We're looking.

SPACECRAFT Okay, we have a capture flag.

CAPCOM Roger.

SPACECRAFT And rigidization has taken place and we have all the proper indications meaning that we're grappled firmly to the PDP.

CAPCOM We copy, that's good.

SPACECRAFT Okay, now we'll have to run through a there'll be a slight pause in the in the action while we get the PDP powered up through the arm and then we'll be ready to take it off. We'll do that as fast as we can. Okay, we have the cabin camera came on if you want to switch around.

CAPCOM Roger, copy Gordo, could you get the TV control switch to command for us, please?

SPACECRAFT Yea, sorry about that, it's in command. We check item 1 asterisk on item 2, on item 3, and item 23. Take item B IDP, read them, and I'll check them. 31, Right on, okay, data mode select item 15 should be there, PDP's power's on now, and gray. Check PDP current voltage. That's good. Data mode select item 16. Check PDP current voltage. Hey, that's good. Data pack PDP transmitter's coming on now, and transmitter item 13,

grapple and pick up the PDP and bring it out and let you all work the cameras and watch what you can. Does that sound like a feasible sort of thing?

CAPCOM That's fine and we'll work the cameras. That will be in about 3 1/2 minutes when we get to MILA.

SPACECRAFT Okay. ...I think we'll have things pretty well preset and then INCO can have at it.

CAPCOM Roger.

CAPCOM Columbia, Houston. We're 30 seconds LOS Buckhorn. We'll pick you up next at MILA in about 2 minutes.

SPACECRAFT Okay give me a go as soon as you have TV.

CAPCOM Wilco.

PAO This is Shuttle Control. Columbia has had LOS at Buckhorn. We'll have Merritt Island in about a minute 20 seconds. Television will begin there. The cameras will be operated remotely from the ground by the Entry Team INCO that stands for Integrated Communications Systems Engineer and he is..

END OF TAPE

SPACECRAFT I'll take one that day. Okay I'm ready to repress the right OMS. Do you want to use the A leg.

CAPCOM That's the affirm. The A leg Gordo.

SPACECRAFT Okay 3,2,1 mark.

CAPCOM Columbia, Houston. You can start the maneuver back to nose sun attitude anytime.

SPACECRAFT Okay I'm setting it up right now Steve.

CAPCOM Roger.

SPACECRAFT Okay right OMS helium's back off. Numbers were 231 on the OX 230 on the fuel prior to repress.

CAPCOM Copy that. Thank you. We're 25 seconds LOS. Next is Buckhorn in 27 minutes. Over.

SPACECRAFT Okay and for Fido or whoever wants to know, I'm spec 33. We had a delta VZ of 35.24, delta V will be total of 42.36.

CAPCOM Copy that and reminder we'll be live TV on the next pass through MILA. Over.

SPACECRAFT Oh really, Okay.

PAO This is Shuttle Control. Orroral has loss of signal. Crew reporting a good burn. The Columbia's orbit before this burn was 127 by 125 nautical miles. With an orbital period of 1 hour 29 minutes 18 seconds the orbit is predicted as a result of the burn to be 136 by 126 nautical miles and the expected orbital period 1 hour 29 minutes 34 seconds. Columbia starts a long trip across the Pacific Ocean now. The next tracking station will be Buckhorn in 24 1/2 minutes. 3 days 22 hours 43 minutes Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 3 days 23 hours 7 minutes Mission Elapsed Time. Columbia is on orbit 65 about to be acquired at Buckhorn. At the Merritt Island Florida station during this pass we'll receive television from the remote manipulator system and the plasma diagnostics package deployment.

CAPCOM Columbia, Houston with you for 2 minutes over.

SPACECRAFT Okay Steve. I'm trying to get set up to give you a show here. We've got the Flight Deck camera on and running. We've also got the alpha, delta and the elbow camera ready. And, I'm getting poised, above, my plan here was to try to be ready to

PAO on the left aft pod. We've been nose to the sun now for a couple days and they went to fire one of the primary RCS engines to see what the thermal reaction is. Duration of that burn is about 1 minute 40 seconds a delta V of 35 feet per second. At 3 days 22 hours 21 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control. Flight Director Tom Halloway and his flight surgeon, Dr. Ellen Shulman have left the Mission Control room on their way to the News Center for the Change of Shift briefing at 8:30 a.m. central standard time. This is Shuttle Control at 3 days 22 hours 27 minutes mission elapsed time. Columbia is at Yarragadee now.

CAPCOM Columbia Houston through Yarragadee for 7 minutes, over.

SPACECRAFT Okay, we're hearing you through Yarragadee. We're in the burn attitude. We feel like we're all set up and just sitting here waiting for it to happen.

CAPCOM Sounds good. Columbia Houston, while we're waiting here for the burn. One reminder when you do grapple the PDP, check the wrist roll angle at -52 degrees, over.

SPACECRAFT Okay, I'll sure do that.

CAPCOM Columbia Houston, minute and 1/2 LOS. Have a good burn and we'll see you next in about 4 minutes in Orroral Valley.

SPACECRAFT Okay, we're all set up in the attitude, a minute to go.

CAPCOM Roger.

PAO This is Shuttle Control at 3 days 22 hours 36 minutes. About 1 more minute before we will have acquisition through Orroral Valley.

CAPCOM Columbia Houston, back with you through Orroral Valley for 4 minutes, over.

SPACECRAFT Okay, the burn's complete. We had a good burn.

CAPCOM Good news. Columbia Houston, you can repress that right OMS anytime, we're looking.

SPACECRAFT Okay, let me get the numbers copied down then I'll do it.

CAPCOM Okay, fine.

SPACECRAFT And being in the darkness, Steve, the forward firing jet was on, the forward up jet was on continuously, the one on the right and was a real spectacular view. We tried to get some pictures of it. We didn't hear the forward jet fire at all like you do in the simulator. It didn't make any noise that we noticed.

CAPCOM Okay, copy.

SPACECRAFT And we see a few lights of cities on the ground and some thunderstorms popping off.

CAPCOM Too bad the NOSL's not onboard. And Columbia Houston, when you did the GPC reconfiguration the star trackers dropped into term idle, so when you get a chance we need to reselect them to track and call up spec 21 and drop it, over.

SPACECRAFT Okay. And we just noticed a little banana chip, dried banana floating around. Gordo said that's for doing a good job.

CAPCOM Okay.

SPACECRAFT There was just, I guess the acceleration of the burn. Dislogged this banana chip somewhere and it came right up in front of us as the burn was over.

CAPCOM We'll give you another one entry day.

SPACECRAFT I'll take one that day.

END OF TAPE

PAO Change of shift briefing is estimated for 8:30 a.m. Central Standard Time in room 135 at the JSC newscenter. CAPCOMs on this shift are Steve Nagel and Brewster Shaw, Nagal has been talking to the crew during the Madrid pass. At 3 days 22 hours 1 minute mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 3 days 22 hours 11 minutes mission elapsed time. Columbia coming up on acquisition through the Indian Ocean station in about 20 seconds.

CAPCOM Columbia, Houston through IOS for 7 and 1/2 minutes, over.

SPACECRAFT Yes, I've gotcha, I'm just taking a couple pictures of the Gulf of Aden, have.

CAPCOM Sounds good.

SPACECRAFT Okay, it's pretty weather over the Gulf of Aden. We took some pictures here yesterday, we was trying to get some visual observations type things that our friends Bob Stevenson and Bill Molner want although its kinda tough to get them at the right attitude and the right sun angle and everthing with the way that this machine keeps rotating. When I did that I activated the PDP and the tape recorder 1 channel 2, I did it at 2206 and the light was off, and I assume that you don't want to try to call up tape recorder 2 and for that reason the monitor level reading is only 3 rather than some other number.

CAPCOM We copy Jack, stand by.

SPACECRAFT Are we still holding to 2235 as a take for the LTU burn?

CAPCOM That's affirm 2235 Gordo.

SPACECRAFT Alright.

CAPCOM And be advised as you know you'll be doing this burn interconnected to the right OMS and in blow down, so you can expect a right OMS tank pressure caution and warning during the burn.

SPACECRAFT Okay, we just want to let one blow down and repress it.

CAPCOM That answer Gordo is we'll let it blow down to the end of the burn then we'll repress it after the burn.

SPACECRAFT Okay, and on page 1-20 of the payload ops checklist I'm referring to where we're supposed to go to track select open in tape recorder 1 and for the third activation go to track

select number 24 on tape recorder 2, and our monitor level is supposed to be 6 to 8, our monitor level is reading 3 and I'm supposed to report that to you, and you got it.

CAPCOM Okay Jack, we copy that. It's no problem, you can press on.

SPACECRAFT Okay, I thought you'd say that, thank you. PDP is activated.

CAPCOM Roger. Columbia, Houston that PDP activation looks good and you are go for PDP deploy at the proper time in the timeline.

SPACECRAFT Alright, we thank you.

CAPCOM Columbia, Houston we're 25 seconds LOS now. On the repress of the OMS we will do it after the burn as I said, and we'll call for it over Orroral where we can see data, and we'll see you next at Yarragadee in 8 minutes.

SPACECRAFT Okay, we'll wait for your call on repressing the OMS.

CAPCOM Roger.

PAO This is Shuttle Control, the Indian Ocean station has loss of signal with Columbia. Next station Yarragadee in about 8 minutes. We're about 14 minutes 45 seconds away the L2U reaction control system burn, that's a thermal test, thermal soak back test of one of the primary reaction control system jets. L2U is an up firing jet on....

END OF TAPE

SPACECRAFT ...look forward to working with you again.

CAPCOM See you tonight.

PAO This is Shuttle Mission Control. Mission Elasped Time 3 days 21 hours 48 minutes to continue with the description of those windows, the crew was reporting streaking on windows W2 through W5. The numbering system for the windows on the orbiter is that there are 6 windows and they are numbered from left to right 1,2,3,4,5,6 as you're seated in the cockpit from left to right and streaking on windows W2 through W5 in essence reports the absence of streaking on the windows at the extreme ends of the panorama of the first and last windows in that row. As CAPCOM Terry Hart reported, the entry team, Crystal Team under Flight Director Hal Draughon, has reported to the Mission Control Center and for the past hour have been proceeding through the debriefing process with Flight Director Tommy Holloway and the Ivory Team. We have loss of signal and will acquire again in about 4 1/2 minutes at Madrid. Mission Elapsed Time 3 days 21 hours 15 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Control at 3 days 21 hours 54 minutes Mission Elapsed Time. Madrid will acquire Columbia in 5 seconds.

CAPCOM Good morning Columbia, Houston through Madrid. The Crystal Team is with you for the day.

SPACECRAFT Steve how you doing?

CAPCOM Real fine and congratulations on a job well done yesterday. We were all glued to the TV set.

SPACECRAFT Well we're just along for the ride. You guys are doing all the work.

SPACECRAFT You there, Steve?

CAPCOM Roger we'll still with you.

SPACECRAFT Okay I was a little remiss on the PGU yesterday but in order to keep the PGU folks happy and amused, I'll give you the mornings reading all ready.

CAPCOM Okay we're ready go ahead Jack.

SPACECRAFT Okay this was read at 2130 about half an hour ago. All lamps are okay. Chamber 7 23.5 23.6 23.3 23.3 23.6 23.8.

CAPCOM We copy those Jack thank you.

CAPCOM Columbia, Houston. 2 minutes to go in this pass. When you're finished with breakfast and back upstairs, we'd like you to cycle both star tracker shutters. The target suppress bits are set and we want to look for stars of opportunity.

SPACECRAFT Well I'm right where you ask me to be and I'll do that right this minute.

CAPCOM Okay thank you.

CAPCOM Columbia, Houston. We're going to remain in our present S band configuration until we are able to troubleshoot the transponder problems at IOS. We will be uplink voice only UHF. If you do have a COMM problem at IOS request you do not do a panel and command until the next UHF site which would be Yarragadee and talk to us first before we do a panel and command. Over.

SPACECRAFT Okay we will not do a panel and command under any condition unless we hear from you.

CAPCOM That's affirm.

CAPCOM Columbia, Houston. We're 30 seconds LOS. Next is IOS in 12 minutes.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia is out of range at Madrid. Now going down across Africa toward the next station the Indian Ocean station in 11 1/2 minutes. Flight Director Harold Draughon and the Crystal Team have relieved Flight Director Tommy Holloway. Holloway's change of shift briefing is estimated for 8:30 am Central Standard Time in room...

END OF TAPE

SPACECRAFT ...and then after staging and then an up in the upper hemisphere or whatever you call it, there were lots of little particles like that that were also white in color, but they didn't go straight on by us anymore they kind of floated along with us.

CAPCOM Okay Jack. What was it proponderance of the snow flaking coming off prior to max Q you think or was it pretty much throughout first stage.

SPACECRAFT I can't give you an answer on that one. My opinion was that the debris that came off was kind of related to the Q bar. I could hear it on the window as it was building up, steadily up and kind of correlating to the indicated airspeed there. And some of the stuff coming off. There was various sized pieces all white. I saw nothing that looked, hinted at all of the brown sofee color white pieces and several of them hit my windshield and left a white smear. Looks almost like a bug, bugs on your windshield of your car. I really would strongly guess that it was those white tiles. There was several very large there white streaks on the forward windows that'll 2 3W 5 and there is also a light residue on the two front windows there that wasn't there when we launched. We tried to photograph those with the 35, (garble) without the flash as specified in the photo TV book.

CAPCOM Roger. That's a real good description. Can you pin down the time that which the streaks occurred on the window from the debris.

SPACECRAFT Yeah I think the big streak in my window occurred when I saw this white object come at us right after liftoff.

SPACECRAFT Most of the time after that I was head down looking at the gauges and sort of really making sure we were doing right. So, a lot of it I can't repeat.

CAPCOM Roger and it sounds like Gordo's windows were streaked sometime later. Maybe around max Q is that right?

SPACECRAFT I think it was a more continuous process Terry, not any one event, but there was stuff coming off all the way through first stage and up I don't know that I can pin down on maximum or seem to correlate with roughly I'm not absolutely certain about this was the noise building up and maximum airspeed and maximum (garble).

CAPCOM Okay that's a good pilot report. Thank you very much. We've got about 2 minutes left here at Bermuda.

PAO Shuttle Mission Control. Mission Elapsed Time, 3 days 21 hours 46 minutes. The numbering system for...

and out of the atmosphere on 2nd stage.

SPACECRAFT Okay, you want us to talk about it. Is the tape recorder around?

CAPCOM Ah, we're not recording voice today and you can give it to us on air to ground, but that's at your convenience if you want to defer that to a little bit later today. We've got about 8 minutes left here stateside, however.

SPACECRAFT Okay, we did some of that the first day and put that on a tape recorder somewhere, maybe you didn't get it or maybe it wasn't complete.

CAPCOM Ah, I think we were recording voice on the first day, Jack, would you be able to recall the MET of that conversation?

SPACECRAFT Terry, I wrote it down and I can get it later when I get back to my book. Jack had most of his comments on the tape. I just started and got interrupted by something and then by the time I got back to it you weren't recording, so I did not have my comments recorded yet. Terry, you still there?

CAPCOM Yea, we copied your last, standby please. And Columbia Houston, we show you're just passing over KSC about this time. I think the weather may be a little cloudy down there today. How're ya'LL feeling this morning, eating a good breakfast, are you?

SPACECRAFT Yea, we're eating everything that's on the menu. We got some catching up to do. I figure we can dig back in the last three days and clean that up before we go home.

CAPCOM Okay, we copy that.

SPACECRAFT (garble) we recall about the boost was that something came off and hit the windscreen shortly after liftoff and that was a W3 window and then after that, it was white color, and after that it seems like I recall a little pieces like snowflakes hitting the windscreen and the W2 and W3 windows, but that stuff was all white too, and there was just smaller pieces in kind of like being in a snow storm. And then after staging and up in the atmosphere I recall that .....

END OF TAPE

CAPCOM At Orroral we'll be sending you a couple duplications and also a new message which will be 034, and that'll be the mission summary for flight day 5, over.

SPACECRAFT Okay.

PAO Shuttle Mission Control, got a brief keyhole as we pass Yarragadee to Orroral, about a minute and a half of loss of signal. Communication between the ground and the crew will be sparse during these early morning hours they wanna give the crew an opportunity to have a leisurely and complete breakfast without being disturbed by a lot of calls from the ground, so until breakfast is complete why I don't think we need to really expect an awful lot of dialog in the air to ground, about a 1/2 minute till we acquire signal again, mission elapsed time is 3 days 21 hours and 2 minutes, this is Shuttle Mission Control

CAPCOM Columbia, Houston AOS at Orroral now for 4 minutes.

SPACECRAFT Okay, reading you loud and clear.

CAPCOM And your loud and clear Jack,

SPACECRAFT Terry, I noticed one of the things when I get (garble) cause we're so busy getting ready to do something else, is that we're not getting any opportunity to take any 16mm movies of how you operate in this thing and maybe tomorrow if there's time we could schedule an hour or so where we could just run through a bunch of things that we think we oughta photograph for documentation.

CAPCOM Okay Jack, that's a good input, we'll go ahead and crank that into our flight planning for tomorrow.

SPACECRAFT I think the morning routines would be a good thing to photograph when your doing your breakfast and doing your paper work and shaving and so forth, and we could all group all that stuff at one time why then we could get it done effeciently rather than just doing it spotty throughout the day.

CAPCOM Okay, we understand your comment and we'll make sure we get back to you before sleep tonight to let you know what you'll be reading in that regard in the morning.

SPACECRAFT Alright, thank you.

CAPCOM Columbia, Houston 30 seconds left here at Orroral and you'll be glad to know you'll be working with the Entry team a little later today. They've been chomping at the bit to get a chance to work with you here, and you'll be seeing them here shortly. We may be talking to you still coming up on MILA though, and that will be at 21:37, we'll see you there.

SPACECRAFT Okay Terry.

PAO Had LOS at Orroral about 30 minute loss of signal period now while Columbia moves across in it's 64th orbit marching toward the next ground station at MILA and at that time we'll have a pass of about 7 and 1/2 minutes in duration, mission elapsed time 3 days 21 hours 8 minutes, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, mission elapsed time is 3 days 21 hours 31 minutes. We're about 5 minutes away from acquiring signal over MILA station, Columbia is on it's 64th orbit of the Earth. It appears that when the INCO begins to try to recover that S-Band number 1 unit that those efforts are going to be made only over stations which have both S-Band and UHF capability just to keep that redundant communication capability available rather than try it over an S-Band station only. Those stations which have both S-Band and UHF capability are Ascension Island, Bermuda, Buckhorn, Goldstone, Guam, Hawaii, Merritt Island, and Madrid. Still another 4 and 1/2 minutes till we acquire signal with Columbia, mission elapsed time 3 days 21 hours 33 minutes, this is Shuttle Mission Control.

CAPCOM Hello Columbia, Houston back with you stateside for 11 minutes.

SPACECRAFT Yes sir, we're just having breakfast, doing the morning routine we got a flight plan updates all in place, and as soon as we finish eating breakfast and cleaning up we'll be ready to have at it.

END OF TAPE

Musical Interlude (Sail Away by Christopher Cross)

CAPCOM Columbia Houston 1 minute left here in Madrid, we'll see you next at Yarragadee at 20 plus 54, see you there.

SPACECRAFT Okay thanks for the music. One of your messages got scrambled. Lines four through eight on the message 31g, 31 gulf.

CAPCOM Okay we copy that and we'll retransmit at Orroral.

SPACECRAFT Okay.

CAPCOM Hello Columbia Houston through Yarragadee for 7 minutes.

SPACECRAFT Okay we're with you at Yarragadee, Terry.

CAPCOM Roger Jack and if you have a minute maybe you could tell us which messages onboard are clear and we'll transmit any that are not.

SPACECRAFT Okay just a second. We've got them all distributed around Terry, I'll just tell you what they are in essence. We got the one about the PDP high voltage, no problem. We got the flight plan update, we got one on the PDRS operations, I believe Gordo did something with that one. We got the one page replacements and I'm just looking at the rest, it looks like a repeat of all of them, we have 31g, 35 bravo, 35 alpha, 36 charlie, 37 alpha, and 40 alpha. Over.

CAPCOM Okay Jack we copy all that. I understand that part of zero three one gulf, lines 4 through 8 were garbled and we will retransmit that one and we'll give you an extra copy of a couple of the others at the upcoming Orroral pass. Over.

SPACECRAFT Okay and you know I did the first procedure on the water boiler this morning and I went to high and put the flash evaporator on but it didn't say anything about going back to normal on the outtemp, do you want me to do that?

CAPCOM Stand by please Jack. Columbia Houston, Jack, that will be coming up a little bit later in the cap, no action at this time.

SPACECRAFT I didn't catch what you said, go ahead.

CAPCOM Roger that step will be coming a little bit later in the cap. No action required on the water boiler at this time.

SPACECRAFT Okay, I'll wait till I get to it.

PAO This is Shuttle Mission Control. Mission elapsed time is 3 days 20 hours 58 minutes. We've got about 3 minutes remaining in this acquisition period over the Yarragadee...

CAPCOM Columbia Houston, we have a comment for Gordo concerning that PDRS ops checklist when you have a minute. We have three minutes left here at Yarragadee.

SPACECRAFT Okay Terry do I need the message, its upstairs?

CAPCOM Yes sir, you do, but no rush on that, we can either get a Orroral here or after your breakfast on the stateside pass. There's no rush.

SPACECRAFT Okay, I've got it in hand, go ahead Terry.

CAPCOM Okay Gordo if you go down to line 14 where the instruction is mode, end effector, enter, there is an error there, end effector should read, Orbiter unloaded. Similar comment down on line 39, end effector should read orbiter unloaded. Over.

SPACECRAFT Okay that's what I used yesterday when I was grappling, that is more logical when you're looking out the window to use that, I understand.

CAPCOM Okay sorry we didn't get it up the first time.

CAPCOM Columbia Houston, 1 minutes left here at Yarragadee, or two minutes from Orroral. We've got AOS at Orroral, we'll be sending you a couple of duplications...

END OF TAPE

The printer should print just fine without being on the takeup spool Jack, if you would just like to let it spill on out there.

PAO Shuttle Mission Control, let me correctly identify the CAPCOM who is Terry J. Hart. Some difficulty onboard with the teleprinter.

CAPCOM Columbia Houston 30 seconds left here in Bermuda, see you at Madrid in 6 minutes.

SPACECRAFT Okay Terry, good morning to you.

CAPCOM Top of the morning to you Gordo, see you at Madrid.

PAO CAPCOM, Terry Hart advised Columbia commander Jack Lousma to let the teleprinter print out, it was the judgement of the flight control team here that it was not imperative that the tape would be on the spool for it to print out properly. Their preparing to retransmit that teleprinted material in the event that it didn't come out printed properly but we can wait until Jack Lousma advises whether that printed data is legible. Mission elapsed time is 3 days 20 hours 15 minutes. This is Shuttle Mission Control looking forward to acquisition of signal in 5 minutes.

PAO This is Shuttle Mission Control. We're expecting acquisition of signal in a minute and a half through Madrid. As the television monitor shows the launch team has inscribed the plotting board with the words welcoming the entry team which has not pulled a shift in the mission control center since flight day one and the back of the mission control center is a banner with three foot high letters also saying welcome back entry team and, subtle chain-pulling by the orbit team, they're the launch team welcoming the entry team back into the control center. We have voice contact coming up in about a half of a minute. Columbia is on its 63 orbit of the Earth. Coming up on acquistion of signal in Madrid in just a few seconds. Mission elapsed time is 3 days 20 hours 20 minutes. This is Shuttle Mission Control.

CAPCOM Columbia Houston we are AOS at Madrid for 5 minutes.

SPACECRAFT Okay.

CAPCOM And Columbia Houston we think we've got five messages onboard at Bermuda. If you don't see those five, give us a call and we'll retransmit them at this time. And Columbia Houston we have another set of teleprinter messages coming your way some of them are duplications of the first, so you will each have a copy.

SPACECRAFT Okay.

CAPCOM And Columbia Houston, we are just going to repeat the first set of five messages incase you didn't get them at Bermuda.

SPACECRAFT Okay.

CAPCOM And Columbia Houston we've got about 2 minutes of music coming for your entertainment and there about 3 and a half minutes left here in Madrid.

SPACECRAFT Okay we'll enjoy it.

Musical Interlude. "Sail away" by Christopher Cross

END OF TAPE

PAO This is shuttle mission control, mission elapsed time, 3 days, 20 hours, 4 minutes. We'll acquire signal in about a minute and a half through Grand Bahama, and the Mila station. And the crew sleep period has expired so you may safely anticipate voice contact through voice contact, first voice contact of the day. Columbia is on its 63 orbit of Earth, and the flight control team is going to transmit up messages in instructing the crew on how to configure to begin troubleshooting this S-band transponder problem. And acquisition of signal in about a half of minute now at mission elapsed time at 3 days, 20 hours, and five minutes, this is shuttle mission control.

CAPCOM Columbia Houston, we're AOS Mila, top of the morning to you. Columbia Houston, AOS Mila, how do you copy?

SPACECRAFT (garble), reading you loud and clear, let me configure the speaker box, okay?

CAPCOM Rog. take your time.

PAO Shuttle mission control, Columbia configuring to

SPACECRAFT Okay, how do your hear me now?

CAPCOM Oh, you're loud and clear Jack, how are you doing?

SPACECRAFT Doing very well, we had to our speaker boxes configured because there's a feedback here and what's next?

CAPCOM Well, next is wake up and take your time, you can disregard the message you received at Orroral there, we weren't able to answer you in time before we went LOS, but it's of no concern. We're still looking at why it happened, we don't quite understand it, but there's nothing wrong with FPEG.

SPACECRAFT Okay, about 4 minute ago we got (garble) on the FPEG indicated, but didn't see anything on the CRT, so we presumed it was okay, we noticed it was on.

CAPCOM We concur, and a short LOS here, we'll see you at Bermuda in about a minute.

PAO This is shuttle mission control, the FPEG discussed was the fault message that was transmitted to the crew during the Orroral valley pass, and the CAPCOM David Griggs advised the crew that it was an unconsequential message and required no action on their part. They have a little keyhole here between Mila, Bermuda and we will acquire voice contact again in just a few moments. Mission elapsed time is 3 days, 20 hours, 10 minutes, shuttle mission control.

CAPCOM Columbia Houston, we're AOS Bermuda, now, if you

don't have anything to talk us about, we can play a little music for you.

SPACECRAFT I better talk to you about something, I'm down here on the teleprinter and I just took a message off and can't get to stop feeding.

CAPCOM We copy, standby please, Jack. Columbia Houston, we are sending messages at this time, is it printing?

SPACECRAFT Are you sending a message?

CAPCOM Affirmative, we're sending several messages at this time and it should be printing.

SPACECRAFT I can't hear what you're saying, but I'd be a good idea if you huh? I think it'd be a good if you'd stop sending your messages until I get this teleprinter reconfigured.

CAPCOM Roger. Columbia Houston, Jack we'd like you just to let that teleprinter run for another 2 minutes here till we're LOS and at that time you should be able to reconfigure it without any problem.

SPACECRAFT Okay, I noticed that the takeup....

CAPCOM Roger. And Columbia Houston, the teleprinter should print just fine without being on the takeup spool, Jack, if you'd just like to let....

END OF TAPE

PAO (garble) waking the crew up in two hours. Mission elapsed time is now 3 days, 17 hours, 58 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Mission elapsed time, 3 days, 19 hours, 14 minutes. Columbia is on its 42nd orbit of the Earth and we have 45 minutes remaining in the crew's sleep period. Columbia is presently out over the Indian Ocean and we expect that after the crew awakes and has breakfast, they will begin to work on the transponder workarounds that the INCO and his backroom technicians have been discussing all night long and looks like nominally another busy day on orbit with additional remote manipulating...remote manipulator system deployments of the plasma diagnostic package. We will acquire signal in about 6 minutes over Yarragadee (Australia) and the flight control team at that point will be getting some data takes and be able to determine if the crew is up early and moving around in the cabin and turning on displays. If that is the case, we shall, of course, advise promptly. Mission elapsed time is 3 days, 19 hours, 16 minutes. This is Shuttle Mission Control.

PAO Shuttle Mission Control at 3 days, 19 hours, 29 minutes.

(garble)

(garble)

PAO This is Shuttle Mission Control. Mission elapsed time, 3 days, 19 hours, 35 minutes. Twenty-four minutes remaining in the official sleep period for the crew. However, during the S-band pass over Orroral Valley in Australia, a fault message, an error message was flagged onboard Columbia. There was a peg out of limits on payload function and it apparently woke the crew and the crew initiated a downlink transmission on air to ground 1; however, the ground station wasn't configured to receive so we didn't get that voice contact. We have subsequently lost signal with Orroral Valley. There was downlink data from Columbia which was assessed by the flight control team and systems onboard are all go. We are in a loss of signal period. We will acquire again in about 30 minutes over the Mila station. Teleprinter message up to the crew has instructed them not to take the transponder 2 down but to await a UHF capability which will give the flight control team the opportunity to talk to the crew on UHF in case there turns out to be additional failures on the S-band transponder. Can anticipate voice contact with the crew when we reacquire over the Atlantic Ocean in as much as we will be outside the sleep period at that point and clearly the crew was awake over Orroral Valley. Mission elapsed time is now 3 days, 19 hours, 38 minutes. This is Shuttle Mission Control.

END OF TAPE

PAO ...remaining in their sleep period. There have been no alarms and no caution and warning signals onboard the vehicle. On one of the earlier passes the flight control team uplinked some TMBU's, table maintenance buffer updates which instruct the onboard computers to have more relaxed standards while they are monitoring the health and well being functions onboard the vehicle. The computers onboard monitor the temperatures, pressures, and a variety of readings onboard and if one of those readings exceeds certain parameters, they trigger an alarm. The purpose of uplinking more relaxed TMBU's during the night is to relax those constraints and to prevent the crew from being continually disturbed by alarms for systems which might not need critical attention. Mission elapsed time is now 3 days, 15 hours, 22 minutes. This is Shuttle Mission Control.

(garble)

PAO This is Shuttle Mission Control. Mission elapsed time, 3 days, 16 hours, 28 minutes. Pass over the ground station at Guam and they took downlinked data from the vehicle indicating onboard systems. The change of shift briefing for the Ivory Team flight controllers and Flight Director Tommy Holloway, will be at 8:30 a.m. Friday morning, Cen...

PAO This is Shuttle Mission Control. Mission elapsed time is 3 days, 17 hours, 55 minutes. Two hours remaining in the astronauts sleep period. Busy day ahead of the astronauts today are the first order of business by the flight control team will be to exercise some mitigating options to determine the extent of the problem with the S-band transponders and we expect that they will be getting to that immediately after breakfast and after the crew gets to be up and around. Also, some more remote manipulator system operations today involving the plasma diagnostic package and plan to duplicate much of the science that was gathered today, or in the previous flight day. They'll be a burn in the orbital maneuvering system, a 100 second burn, to determine the performance of the OMS orbital maneuvering systems engines after that cold soak with the nose to the sun for some 80 hours. That 80 hour nose sun attitude concludes during this flight day also and that certainly is one of the more extreme thermal tests that Columbia has undergone to date. There is 50 minutes remaining until another acquisition of signal pass through Madrid. Data downlinked the vehicle continues to flow thorugh the working S-band transponder and it indicates the shuttle systems are performing nominally while the crew sleeps and that there have been no caution and warning alarms to disturb their rest this evening. Be waking the crew up in 2 hours. Mission elapsed time is now 3 days, 17 hours, 58 minutes. This is Shuttle Mission Control.

END OF TAPE

PAO Resolve or more completely understand that problem while we have the s-band opportunity at Santiago. That station comes up in 13 minutes. And will be the first data take we've had from the vehicle at that time in a hour and a half. The astronauts have been into their sleep period for a hour and a half, yes an hour and a half. And we are just a little more than 12 minutes from acquisition of signal. Columbia is on its 58th orbit of the Earth. Presently over the South Pacific Ocean and preceding on down toward the Santiago, Chile station. Mission elapsed time is presently 3 days 13 hours and 30 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. The vehicle is now within range of the Santiago station and we're getting data. We are getting data through the s-band station in Santiago, Chile and mission control center is processing that data now.

PAO This is Shuttle Mission Control. Flight controllers here in the control center are looking at the data from Santiago now, determining the health and well being functions onboard Columbia. And flight director Tommy Holloway will momentarily ask each position for a status report and determine whether any problems are present onboard. Mission elapsed time is 3 days 13 hours 46 minutes and we will have that status update from the flight control team momentarily.

PAO This is Shuttle Mission Control. Flight director, Tommy Holloway has completed his poll of flight directors and each reports good data from the Santiago pass and each reports that their perspective onboard systems are performing nominally and that health of Columbia continues to be good. Next station pass will be through Ascension Island in about 7 minutes. Columbia is on its 59th orbit of the Earth. And the crew is about 2 hours into its sleep period. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Mission elapsed time is 3 days 15 hours 20 minutes. Right now the space shuttle Columbia is over the ground station at Santiago, Chile. That s-band station where we are once again acquiring good data using the working s-band transmitter transponder onboard Columbia. Flight director Tommy Hollowary has gone around the room asking each of his flight controllers whether they got good data from the vehicle and whether their systems are performing nominally and was responded to in the affirmative on each case. Columbia is just leaving the range of that ground station. It's on its 59th orbit of the Earth. The astronauts have four and a half hours remaining in their sleep period. There have been no alarms and no caution and warning signals onboard the vehicle. On one of the earlier passes the flight control team uplinks some TMBUS table maintenance buffer updates which instructs the STS-3

onboard computers to have more relaxed standards while they are monitoring the health and well being functions onboard the vehicle. The computers onboard monitor the temperatures and pressures and a variety of readings onboard.

END OF TAPE

PAO About 10 minutes away from the initiation of sleep period for the Columbia crew. Mission elapsed time is 3 day, 11 hours and 50 minutes, this is shuttle mission control.

PAO This is shuttle mission control, we're about a minute and a half away from acquisition of signal through Santiago Chile station. To recap the nature of the problem once again. There are two transponders on board the Shuttle. Transponder 1 is functioning normally, the problem lies in transponder number 2. Each transponder has high frequency and low frequency capability, high power and low power capability. What we have determined is that transponder number 2 in low power is failed. What we don't know, is the status of the high power side of transponder number 2, and we don't propose to try to determine that tonight. We propose rather to give priority to crew rest, and the crew have a good night's sleep. And as much as troubleshooting that system would require crew participation, would require crew's assistance and throwing switches on board the vehicle, and a feeling of the flight control team is that priority indeed with crew rest and that the troubleshooting can occur tomorrow and not tonight. The vehicle is presently configured using transponder number 1, and it is configured in the manner that there is redundancy because the instrumentation and communications officer will have the capability to change between high power and low power, high frequency and low frequency within that single transponder. The concern is that we maintain the capability to get good data through the night and using the good transponder and those capability for redundancy. We have high confidence that we shall be able to do that troubleshooting of the suspect transponder will be deferred until tomorrow when the crew gets up and get a fresh start on flight day number 4. Mission elapsed time is now 3 days, 12 hours, and 10 minutes, this is shuttle mission control.

PAO This is shuttle mission control, we've had loss of signal over the Santiago station and we did acquire S-band data during that pass. And we now go on a circuitous flight path where we skirt around and among and between the ground stations until we once again encounter Santiago in one hour and 27 minutes, so this will be a long LOS period. But the pass over Santiago did verify that we'd acquired downlink data. Crew should be asleep now, it's 15 minutes into their sleep period. Mission elapsed time is 3 days, 12 hours, 15 minutes, this is shuttle mission control.

PAO This is shuttle mission control, we are still in that long LOS period, loss of signal period. As the vehicle, on this particular ground track avoids most of the ground stations as it goes around the Earth, and picks up the same ground station at Santiago, Chile that it picked up on its most recent contact. The INCO, the instrumentation and communications officer, the systems officer who is responsible for the

transponder problem is presently in the back room working with his technicians and trying to see if they can come up with a work around or some method of examining the transducer problem. That system's officer is Al Pennington, and we're coming up on an AOS, acquisition of signal at Santiago, which is of course that S-band station. And when he comes out of that meeting with his technicians, they may have some new method of trying to resolve, or more completely understand that problem, while we have the S-band opportunity at Santiago. That station comes up in 13 minutes, and will be the first data take we've had from the vehicle in, at that time, in an hour and a half.

End of tape.

CAPCOM Open system 2 close system 1.

SPACECRAFT Are you still there Dave?

CAPCOM Roger Columbia, we're still here, I say again open system 2, and close system 1.

CAPCOM Columbia Houston with you for about another minute. How do you read.

SPACECRAFT We're all clear, we did the N2 the system. The spec 1 on CRT 1, we did item five and item seven on spec 23, we repressed the left OMS through helium press A and that's about it, isn't it?

CAPCOM Okay that's all good Jack, just a couple more cleanup things, your current state vector is not quite adequate to support a northrup rev 64, were going to update that after you go to bed it will be good. And finally tommorrow will be a essentially a nominal day except as briefed so far and although we haven't had much time with you we've enjoyed it, we've got 30 seconds to go and we'll see you tommorrow.

SPACECRAFT Okay thanks alot Dave, we'll look forward to it and we're going to hit the sack now.

CAPCOM And Jack one more message, we would like to leave spec 1 up over through Santiago and also give up a panel command please.

SPACECRAFT Okay, there's your panel command and we'll have a spec 1 all night if you want.

CAPCOM Okay Jack have a good sleep, enjoyed it.

SPACECRAFT Roger.

PAO This is Shuttle Mission Control. We had loss of signal through Hawaii. Twelve minutes from the initiation, the crews sleep period. The crew is instructed to configure the transponders. So that the good transponder number 1 would be operative during the sleep period tonight so that the flight control team could continue to look at the s-band data that's broadcast by Columbia. We'll have acquisition of signal through Santiago in 20 minutes, but as much as we will be in the crew's sleep period why there won't be any voice contact. During that pass the CAPCOM, David Griggs, instructed the crew that the instrumentation and communication officer would be doing some work with the communication gear and made reference to a IO error or an input output error in which might generate a caution or warning alarm on Columbia and thats a product of the INCO's work N2 leak reference of gaseous nitrogen. Pressure anomaly has been

a situation that has been watched throughout the flight. There's not any real degree of certainty that there's a leak or an instrumentation problem or a bad gage or the exact nature of the situation. It isn't quite well understood, but as a precautionary move, the crew was told that deselect the n2 system number 1 which had been demonstrating that lower pressure and to select or open into system number 2, that n2 system, nitrogen system is the method by which the Columbia's cabin is pressurized. The state vector is an update to navigational aids, the crew is advised that the flight control team would be updating the state vector. And the crew was advised to expect a nominal flight plan for day number 5. We will have acquisition of signal in about 18 minutes over Santiago and we will be looking for data acquisition during that pass. Following that the flight plan takes a circuitous route which kinda sneeks around each one of the ground stations and misses the ground tracks on every station except Santiago, again. So once we pass Santiago it will be another hour and a half another one full orbit before we get data once again. About 10 minutes away from the initiation of sleep period for the Columbia crew. Mission elasped time is now 3 days 11 hours 50 minutes, this is Shuttle Mission Control.

END OF TAPE

The vehicles are preforming within nominal constraints. There were no voice pass, there were no voice contact during that pass and as much as the vehicle was properly configured and we're only 45 minutes from sleep and the crew is preforming some presleep activity and some scheduled exercise regimes and other items on the crew check list. We will acquisition of signal again in about 30 minutes through once again, through the s-band station at Hawaii for about 4 minutes duration. The flight control team is now discussing troubleshooting the s-band problem. There are two s-band transponders onboard the vehicle and they have the capability for redundancy in a variety of modes, each transponder has a high power and low power modes, in addition to high frequency and low frequency modes. Giving the instrumentation and communication officer a variety of tasks through which he may route communications through those two transponders and through those various power levels and frequency levels. Overnight the plan is to operate on transponder number 1 which is a good transponder and achieve some redundancy to, to (garble) a deployment and to essentially not to bother the crew, at this juncture, with troubleshooting that problem, and to look at that data through the evening and to try to design some litergating procedures which can provide redundancy through the transponders systems. We will have acquisition of signal again in about 26 minutes through Hawaii. Mission elasped time is now 3 days 11 hours 16 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. We're about 30 seconds from acquiring signal through the ground station at Hawaii, this will be a s-band pass. About 4 minutes in duration and the crew will be instructed to try to get some data and some COMM through the high power mode on the failed transducers, transponders. We will have voice contact momentarily.

CAPCOM Columbia Houston, with you through Hawaii for about 4 minutes. How do you read?

SPACECRAFT Okay we're reading you loud and clear, how do you read me Dave?

CAPCOM Roger, loud and clear Jack, we've got about four or five messages we need to get to you before sleep period if you're ready to copy and also ready to listen for us.

SPACECRAFT Standby. Okay, go ahead.

CAPCOM Okay, Jack the first one is INCO is going to be doing some COMM reconfiguration, you might expect an I/O error towards the end of this pass. Just disregard that. Second we need a GNC spec 1 prior to LOS at this pass in order to reconfigure the parameter downlist to the nominal configuration. Number three, the GNC reconfiguration performed

today effected some of props data, we need to have Gordo or you reenable the left oms gaging, that's on spec 22, item 5. Correction spec 23, item 5 and then terminate the gaging with an item 7. Also at your interconnect return this evening, we would like you to repress the left oms through the a-leg and please do that during this pass if possible.

SPACECRAFT Yes we got it entered, we got the (garble) taken care of all here. We repressed the left oms for the left helium right now. You've got spec 1 on CRT 1.

CAPCOM Okay that sounds good. Also it appears that the n2 leak, a couple of days ago may have reappeared on system one for the sleep period we would like you to do a open N2 system 2 and close N2 system 1.

SPACECRAFT Okay open N2 system 2 and then do what?

CAPCOM Open system 2, close system 1.

SPACECRAFT Are you still there Dave?

CAPCOM Roger Columbia we're still here, I say again open system 2, and close system one.

END OF TAPE

PAO for a voice contact and data. And we will acquire signal in about 15 and a half minutes through Botswana through UHF, it's a brief pass of about 2 minutes in duration and the capsule communicator. During that pass we'll give priority to instructing the crew to configure their S-band transponder properly so that we can have voice contact through the subsequent pass at the Indian Ocean station where we'll have a little over 5 minutes to talk to the crew and discuss the nature of this problem and see if we can configure the vehicle properly for acquisition of signal and telemetry during the overnight period and more clearly understand the nature of the difficulty of that transponder. Mission elapsed time is 3 days, 10 hours, 41 minutes, this is shuttle mission control.

PAO This is shuttle misison control, mission elapsed time is 3 days, 10 hours, 56 minutes. We're 20 seconds away acquisition of signal through the UHF station at Botswana. A brief pass, and a vicinity of about 2 minutes long, and capsule communicator will give priority to instruction the crew on to configure the S-band transponder to assure we have communication on the upcoming pass at Indian Ocean station.

CAPCOM Columbia Houston, Ivory team with you through Botswana for a couple of minutes. How do you copy? Columbia Houston, Ivory team with you through Botswana for a minute and a half, how do you copy?

SPACECRAFT Read you loud and clear, Dave, how me?

CAPCOM Very good Jack, nice to be talking with you again. We've got one thing we'd like you to do as soon as possible to try and get our comm back into normal configuration.

SPACECRAFT Say again your last, I didn't copy that Dave.

CAPCOM Okay Jack in order to get out comm back into configuration, we would like you to select transponder mode SGLS on panel A1 and then give us a panel command and then select STDN transponder for us if you would please. How copy Columbia?

SPACECRAFT Okay, tell me again what switch goes to SGLS.

CAPCOM Transponder mode to SGLS. Panel A1 Jack, S-band PM panel, the rotary switch to SGLS and then a panel command, and then the same switch back to STDN.

SPACECRAFT Okay, I did all that, give it a try.

CAPCOM Very good, we're about LOS and we'll be looking a good comm once again. We'll pick you up at IOS.

SPACECRAFT Okay.

PAO This is shuttle mision control. We had loss of signal through the UHF station at Botswana and the capsule communicator Terry Hart did complete instructions to, let me correct that, to capsule communicator David Griggs did complete instructions to Columbia commander Jack Lousma in configuring the vehicle for acquisition of signal through S-band at Indian Ocean station. We'll have that contact in 5 and a half minutes. Mission elapsed time, 3 days, 10 hours, 59 minutes, this is shuttle mission control.

PAO This is shuttle mission control, just 10 seconds away from acquisition of signal through the S-band station at Indian Ocean station where we will begin to try to trouble shoot that as being transponder problem. This is mission control at 3 days, 11 hours, and 5 minutes. Mission control is receiving data through the S-band station.

PAO This is shuttle mission control. We've had loss of signal through Indian Ocean station, and we did get good down link data during that pass and the flight control team acquired assurances that the vehicle's performing within nominal constraints. There was no voice pass, or no voice contact during that pass, and as much as the vehicle was properly configured and we're only 45 minutes from sleep and

End of tape.

PAO This is Shuttle Mission Control. The flight control team handover is taking place in the Mission Control Center now with Flight Director Neal Hutchinson and the Silver Team relinquishing command and control of the mission to Flight Director Tommy Holloway and the Ivory Team. The flight controllers are massaging a problem having to do with the transponder number 2 onboard Columbia, which is apparently experiencing a failure in the downlink mode producing an inability to transmit data or voice communcations from the vehicle to ground stations. During the next pass at Santiago, there will be no voice and no data in as much as Santiago is an S-band station only and the S-band transponder number 2, which is currently selected onboard Columbia, is inoperative. There will be a brief UHF pass over Botswana and for the next several passes, communications passes, the flight control team will be trying to more precisely understand the nature of the S-band transponder failure and discuss our work around here in mitigating actions. We are 16 minutes from acquisition of signal at Santiago, normally, however, in as much as we believe the crew has the inoperative transponder number 2 selected, in all probability there will be no voice and no data through the Santiago station and the pass through Botswana where we have UHF contact is very brief, on the order of about 2 minutes. Mission elapsed time is now 3 days, 10 hours, 18 minutes and we're about an hour and 40 minutes from interfering the sleep period for the crew.

PAO This is Shuttle Mission Control. Mission elapsed time is 3 days, 10 hours, 34 minutes. We're coming up on acquisition of signal through Santiago. Once again, we suspect the crew has selected the transponder number 1 and there may not be voice or data through this pass; however, the malfunction procedure is for the crew, once it realizes that they have no voice contact, their malf procedure is to panel command or manually select the alternate transponder in which case, if they do that before we lose contact, there will be the opportunity for some voice and data acquisition throgh Santiago. Acquisition will be momentarily and duration of this pass over Santiago will be about 5 and 1/2 minutes, and we'll stand by to see if there is voice contact affected during this pass. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Obviously, no voice contact as yet; however, we will have contact through Botswana, which is not an S-band station in as much as this failure is associated with the S-band equipment and Botswana has the UHF capability and we would acquire Botswana 20 minutes from now and the duration of that pass; however, is rather brief, in the vicinity of about 2 minutes in duration. Still 3-1/2 minutes remaining until we lose signal through, lose the capability for signal through Santiago (Chile).

PAO This is Shuttle Mission Control. We have had loss of signal, loss of the opportunity for signal through Santiago (Chile) and clearly the crew did not panel command the alternate transponder for voice contact and data and we will acquire signal in about 15-1/2 minutes through Botswana...

END OF TAPE

SPACECRAFT 26.4, 26.2, 26.2, 26.7, 27.4, you'll copy?

CAPCOM We copy and we're going LOS, we'll talk to you at Santiago at 10:34, thank you.

SPACECRAFT See you later.

CAPCOM Okay and enjoy dinner.

SPACECRAFT Alright.

PAO Mission Control Houston at 3 days 9 hours 38 minutes, mission elasped time. We have just passed out of range of the Indian Ocean station and we will be reacquiring communication with Columbia on the downward track of orbit number 56 in about 29 minutes. This is Mission Control Houston.

PAO This is Mission Control Houston. The flight controllers change of shift briefing with offgoing flight director Neil Hutchinson is currently scheduled to begin in approximately 8:30 p.m. centeral standard time in room 135 in building 2. That conference is still scheduled for approximately 8:30. This is Mission Control Houston.

PAO Mission Control Houston at 3 days 9 hours 52 minutes mission elasped time. In the upcoming change of shift briefing that due to take place at 8:30 p.m. central standard time, we will have flight director, offgoing flight director Neil Hutchinson, Doctor Sam Pool, the chief of the medical science division, here at the Johnson Space Center and Doctor Werner Neupert, the OSS-1 program scientist from the Goddard Space Flight Center. That breifing again scheduled to begin at 8:30 this evening. This is Mission Control Houston.

PAO This is Shuttle Mission Control. Coming up in the pass over the Hawaii station for seven minutes and we will be ...

CAPCOM Houston through Hawaii for seven minutes over.

SPACECRAFT Okay Sally got you loud and clear.

CAPCOM You're loud and clear also, Gordo. And for information it looks to us like we may have lost the downlink from transponder number 2, s-band transponder number 2. We think right now its low power only, we're going to be doing some troubleshooting over this Hawaii pass to make sure its only the low power and we ask you, we may have to ask you for a panel command one or two times this pass.

SPACECRAFT Alright.

CAPCOM Columbia Houston we have no messages for you right

now this pass but we're interested in how you are doing as far as dinner goes and getting ready for the evening?

SPACECRAFT Jack is finished eating, I'm working at it. I'm half way through chow, I'm trying to eat the complete scheduled meal here.

CAPCOM Roger we copy. Columbia Houston we saw targets press bid in the minus "z" tracker. We would like you to cycle that shutter at your convenience

SPACECRAFT We'll cycle the "z" tracker.

CAPCOM Affirm.

CAPCOM Columbia Houston with one minute left, we would like a panel command at this time.

SPACECRAFT (garble) You got it.

CAPCOM Roger we thank you and we got 45 seconds left here. Santiago is next at 10:34 and that will be a medical conference.

SPACECRAFT Okay will talk at 10:34. And we'll start a fuel cell purge.

CAPCOM Roger we copy that. And Jack this will be the silver team last pass for the day, we sure enjoyed working with you. You had a super day.

SPACECRAFT Well thank you, we're staying with it, we couldn't do it without you, have a good rest and we'll see you tommorrow.

CAPCOM Roger that.

PAO This is Shuttle Mission Control. The flight control team handover is taking place in the Mission Control Center now with flight director Neil Hutchinson.

END OF TAPE

PAO This is mission control, Houston at 3 days, 9 hours, 28 minutes, mission elapsed time. We're on orbit number 56, and have just passed out of range of the Botswana tracking station. We'll be reacquiring in about a minute and a half or so at Indian Ocean station for a past lasting several minutes. And we'll then have quite a long time that we're out of communication until reacquire over Hawaii. The flight controllers are passing up some notes during this last pass to let the crew square away all the items of work remaining so that they can get the vehicle properly configured for the evening. At 3 day, 9 hours, 29 minutes, mission elapsed time, this is mission control, Houston.

PAO Mission control, Houston standing by for acquisition of signal with Columbia at the Indian Ocean station.

CAPCOM Columbia Houston, through Indian Ocean for 7 minutes, over.

SPACECRAFT Okay, hear you at Indian Ocean, we disabled channel 2 of tape recorder 1 at 826. 8 plus 26 and the light off.

CAPCOM Roger, 8 plus 26 and the light was off. And do you have the time for last night, the MB7 of disable?

SPACECRAFT Standby, okay, last night was 1103, 1 1 plus 0 3, and the light status was on.

CAPCOM Copy, 1103, and lights were on.

SPACECRAFT You copy?

CAPCOM Thats affirmative, we copy Jack. Columbia Houston, I'm afraid I made a mistake when I read you up the rotation time. I failed to give you the seconds on that. The 0937 is correct, and you should add to that 09 seconds.

SPACECRAFT Okay, 09 seconds.

CAPCOM Okay. Columbia Houston, the topping evap heaters that we read up to you earlier, we decided that we'd like you turn those on now, if you could, so that we could take a look at them while we've got data.

SPACECRAFT Okay.

CAPCOM And those were the topping evap heater left nozzle, right nozzle to be auto and duct to bravo.

SPACECRAFT Okay, how much longer we got in the pass?

CAPCOM We got 3 minutes left.

SPACECRAFT Okay, be right with you. Those heaters are on now have a look.

CAPCOM Okay, thanks Jack.

SPACECRAFT Sally, I got some PGU data for you, how much do you want?

CAPCOM We're ready for it Jack.

SPACECRAFT Okay, where do you want me to begin? I got 3 readings today, breakfast, lunch and dinner.

CAPCOM How about starting with breakfast.

SPACECRAFT Okay, breakfast; 2 days 42 hours all lights are okay. Starting with chamber 7, 23.1, 23.3, 22.9, 22.9, 23.3, 23.7 how copy?

CAPCOM We copy, go ahead.

SPACECRAFT Okay, lunch; day 3, 3 hours 20 minutes, all lights are okay. Chamber 7, 26.0, 26.0, 25.8, 25.8, 26.5, 27.8, how copy.

CAPCOM We copy, go ahead.

SPACECRAFT Okay, dinner; day 3, 9 hours, 35 mintues, with 3 minutes to go, all lights are okay. Chamber 7, 26.3, 26.4, 26.2, 26.2, 26.7 and 27.4, how copy.

CAPCOM We copy, and we're going AOS, we'll talk to you at Santiago at 10:34, thank you.

SPACECRAFT See you later.

End of tape.

PAO (garble) the way the crew has been eating this flight and altering the meal plans, it's difficult to tell right now until we actually hear from them whether they have actually eaten that for dinner or not. It's been a very productive day today being the first time that a paylaod has been unberthed and removed by the remote manipulator arm taken out of the payload bay and then successfully reberthed. Standing by for communication momentarily. This is Mission Control Houston.

CAPCOM Columbia Houston through Botswana. How do you read?

SPACECRAFT Loud and clear Sally, How me?

CAPCOM Loud and clear Jack.

SPACECRAFT Okay. I heard you say something about a maneuver. I don't know what it was but I went up and checked and it looked like I was in the wrong place, so what happened when we came out of our attitude hold before was (garble) into last maneuver, we bumped the stick accidentally and didn't notice we were in manual until quite a bit later on. We used the wrong day to get back into rotation, but I think I'm okay now.

CAPCOM Roger. We understand all that Jack. We were pretty sure we knew what the problem was. We don't have data over Botswana but I do have an attitude that will be your tweak for the night, which is biasing the roll attitude just a little bit for the night so that it will be centered at middle of the night and be just a little off in the morning. I can give that to you if you like.

SPACECRAFT Okay. Go ahead please.

CAPCOM Okay. That'll be the same pitch and yaw and a roll of 96.0. You can initiate the rotation at 0. You can initiate the rotation at 0937.

SPACECRAFT Okay. 0937 and that'll be a roll of 96 and is...I think about .134 in there now. Whatever it is. Is that all right?

CAPCOM Jack, we'd like .135.

SPACECRAFT All right. I'll make it .135.

CAPCOM Okay. We think that's what you've got. And I've also got water dump quantities for you.

SPACECRAFT Go ahead.

CAPCOM Okay. Tonight, we'd like you to dump tank BRAVO to

1% all the way down and tank ALPHA to 90%, 9 0 percent.

SPACECRAFT Okay, to BRAVO 0 and ALPHA 90.

CAPCOM That's afirm. And that's a bit water dump so that you should'nt need one tomorrow morning.

SPACECRAFT Okay.

CAPCOM And we've got a heater configuration that we'd like you to set presleep when you're configuring the rest of the cabin for presleep.

PAO How much time do we have left in this pass?

SPACECRAFT Okay, (garble)

CAPCOM Roger. On panel L-1, we're going to want the topping evap heater left nozzle and right nozzle to B-AUTO, BRAVO-AUTO and the topping evap heater duct to BRAVO. And again that's presleep. And Jack, that's to set us up for a DTO for tomorrow.

SPACECRAFT Okay. I'll take care of it.

CAPCOM Okay.

SPACECRAFT Evaporator off. Right?

CAPCOM That's correct. And Columbia with a minute and a half left at Botswana. Sometime this evening, the payloads people would like to get the PGU readings and the actual MET of disable from last night. We don't need you to get that now but we would like it sometime before sleep. And also, for your information, we think we may have a problem with the low power in transponder number 2, which is why the panel command was necessary over the last sight and we intend to do some troubleshooting over Indian Ocean which is our next S-band sight.

SPACECRAFT Okay.

PAO Go ahead.

CAPCOM And Columbia with 40 seconds left. Could you verify that the reason that you performed the panel command was because you did hear my call?

SPACECRAFT I can verify that. I heard your call and I did it.

CAPCOM Okay. Thanks. That'll help us. We're 30 seconds to LOS and we sent you a couple of teleprinter messages that we would like you to check and we'll talk to you again at Indian

Ocean in 2 minutes.

SPACECRAFT Okay. And by the way. That was the only call that I did hear at that station.

CAPCOM Thanks a lot. That helps us.

PAO This is Mission Control Houston at 3 days, 9 hours, 28 minutes mission elapsed time. We're on orbit number 56 and have just passed out of range of the Botswana tracking station. We'll be....

END OF TAPE

CAPCOM That's affirmative Jack, we don't have those numbers for you yet though.

SPACECRAFT Okay.

CAPCOM Columbia, we're 50 seconds to LOS, Santiago is next in 23 minutes and we'll have a water dump for you then. Columbia Houston with 20 seconds left; you might check the teleprinter and we'll have a water dump quantity for you in Santiago in 23 minutes.

PAO Mission control Houston at 3 days, 8 hours, 38 minutes, mission elapsed time. Just had loss of signal through Hawaii orbit number 55. Gordon Fullerton reported that they have rebirth the plasma diagnostic package and have put the arm away for the night, completing a very full and productive day of activities with those two systems. While they were passing through Hawaii, the downlink data gave ground controllers an opportunity to see how all the other onboard systems were performing and a brief check of the room determined that everything looked good at this point. Be about 22 more minutes before we reacquire communication with Columbia again over the Santiago tracking station in South America. At 3 days, 8 hours, 39 minutes, mission elapsed time, this is mission control, Houston.

PAO Mission control Houston at 3 days, 9 hours, mission elapsed time. Just a few seconds away from reacquiring communication with Columbia over the Santiago, Chile tracking station.

CAPCOM Columbia Houston, over Santiago in the blind, we're getting no downlink from you, we'd like a panel in command on C3. Columbia Houston, in the blind over Santiago receiving no downlink, request panel, then command. Repeat, request panel, then command, over.

SPACECRAFT Okay, there's your panel, then command.

CAPCOM Roger, Jack, you're loud and clear, and we've got 1 minute left at Santiago. And Jack, we'd like you to check your teleprinter messages that we sent up and we've also got an attitude for you. We'd like a roll of 235.0 that you can initiate at 0920. Columbia Houston, how do you read?

SPACECRAFT I read, Sally.

CAPCOM Roger, you're loud and clear, and that was a roll of 235.0 initiate at 9 plus 20. Columbia going over the hill, we'll talk to you at Botswana in 17 minutes.

SPACECRAFT Okay, Sally, how do you read?

CAPCOM Roger, you're loud and clear. Did you copy the maneuver?

PAO Mission Control Houston, 3 days, 9 hours, 5 minutes, mission elapsed time. Had some considerable difficulty with communications on that pass and were unable to pass up some instructions that time. We'll be trying that again in about 16 minutes over the Botswana station. On orbit number 55, the third day of the flight, this is mission control, Houston.

PAO Mission Control Houston, at 3 days, 9 hours, 21 minutes, mission elapsed time. We're coming up now on reacquiring communication with the Columbia through the Botswana tracking station. Crew is currently scheduled to be in their meal period, having their dinner. According to the schedule, the meal for the day, at this time of day, would normally be tuna, macaroni and cheese, peas, peach ambrosia, chocolate pudding, and lemonade. But the way the crew has been eating this flight, and altering the meal plan it's difficult to tell right now until we actually hear from them whether they have actually eaten that for dinner or not. It's been a very productive day today, seeing the first time that a payload has been unberthed and

End of tape.

CAPCOM Columbia Houston back through with you through Botswana for four and one half minutes over.

SPACECRAFT Okay we're holding up on the berthing til Jack gets this coas cap on. We're getting a delta bias of point four eight.

CAPCOM Copy, point four eight. Columbia Houston with one minute left in this pass just for information, STS-1 and 2 we saw delta biases of point 27 and point 22. Those were in the forward station and the mer said they expected about point 6 delta bias in the aft station. So it looks like its in the right ball park.

SPACECRAFT Say again, you broke up there.

CAPCOM Roger Gordo, with 40 seconds left, we were just passing you some information that on STS-1 and 2 in the forward station we saw delta biases of point 27 and point 22 and in the aft station we expected about a point 6 delta bias. So it looks like these numbers jive.

SPACECRAFT Okay.

CAPCOM And we're 15 seconds LOS, Hawaii's next in 43 minutes.

PAO Mission Control Houston, at three days 7 hours 54 minutes mission elasped time. Passed out of the range of Botswana tracking station and there will be about 42 more minutes before we reacquire over Hawaii. On this orbit number 55, once again we are in that period of time during the end of the day where we have the orbit track has precessed westward and we do not pass over as many ground stations as we do during the pointest, point of highest activity during day. The crew has reported during this pass that they have not yet berth, the plasma diagnostic package. And are waiting to finish the crew optical alignment system calibration. Which is currently going on as we pass over Botswana. And once they get accomplished, that accomplished presumably they will return to the berthing of the PDP. At 3 days 7 hours 55 minutes mission elasped time, this is Mission Control Houston.

PAO This is Mission Control Houston at 3 days 7 hours 59 minutes mission elasped time. We are currently on orbit number 55 and still in the middle of a long loss of signal period. The next change of shift briefing for the off going flight controllers is currently scheduled for approximately 8:30 p.m. standard time this evening. That will be held in building 2 room 135, with flight director Neil Hutchinson, the off going flight director at that time. Three days eight hours mission elasped time, this is Mission Control Houston.

CAPCOM Columbia Houston through Hawaii, how do you read?

PAO Mission Control Houston standing by for acquisition of signal at Hawaii.

CAPCOM Columbia Houston through Hawaii, for one minute, how do you read?

SPACECRAFT Loud and clear, how do you read?

CAPCOM Loud and clear, Jack.

SPACECRAFT Well Sally its berth and the arm's cradle is put away for the night. It took 4 minutes to go in and berth it this time with (garble)

CAPCOM Roger Gordo we copy. Your getting faster.

SPACECRAFT (garble) channel two, twenty six. eight plus two six.

CAPCOM Okay, eight plus two six. And we're 15 seconds to LOS, Santiago is next in 25 minutes.

SPACECRAFT Okay see you there.

CAPCOM And correction Jack, that's a keyhole, we've still got 2 minutes.

SPACECRAFT Oh good. Okay I guess we've did about everything except the fire and smoke supresion test of the annunciator, caution and warning lamp test.

CAPCOM Roger Jack, we copy that.

SPACECRAFT And are you going to want a water dump tonight?

CAPCOM That's affirmative Jack, we don't have those numbers for you yet though.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT We are holding at point, let's see .133 right now for this pass. You can whip up some TV real quick we turned on the elbow camera and we have an extreme good close up view of the missing tile on the nose from here.

CAPCOM Columbia, Gordo we're not able to get the TV cranked up this fast if you could get it on VTR and play it back to us later we'll be able to get a look at it that way.

SPACECRAFT Oh okay, I guess there are no suprises.

CAPCOM Okay, we'd still like to get it.

SPACECRAFT And you want me to go ahead and maneuver to the IMU align attitude on time or want to use as far as they're in there?

CAPCOM Jack, we've got this scheduled with COAS calibration, so we're going to need to have you maneuver to the attitudes, and do the align as published.

SPACECRAFT Okay. Looks like to me that we might not have enough time to get this sequence done in order to start the IMU maneuver on time.

CAPCOM Roger Jack. And Jack if you got a minute we'd like to take a look at the housekeeping data from the FPEG if you could call up spec 92, and do an item 23 we'll get some good data down here.

SPACECRAFT You got it.

CAPCOM Roger thank you. And Columbia, the EMI search is not sensitive to the Spacecraft attitude so you can go ahead and do the IMU alignment while the EMI search is going on.

SPACECRAFT Okay.

CAPCOM Columbia, we'd like to make a couple of changes to the downlist if you could give us spec 1 to a GNC machine, we'll start that.

SPACECRAFT Okay, CRT 2.

CAPCOM Roger, CRT 2. Columbia, we've got 2 minutes left in this pass after the states pass we're coming up on a pretty long LOS when you're done with the EMI search, you got a go to berth the PDP and after that, ungrapple, cradle the arm latch it up, and stow it. And the RMS people and the PDP people would like to thank you for a real good job today, they got a lot of good data and we got some great pictures.

SPACECRAFT Okay, I understand, thank you very much.

CAPCOM Roger, and when you're finished with RMS ops you can go ahead and turn off all the bay cameras.

SPACECRAFT Alright, you let me know when we can get on with the EMI search here.

CAPCOM Roger, we've got about 1 minute to LOS, you can get on with it then. Columbia, we're 40 seconds to LOS, Botswana's next in 35 minutes, and we sent you a state vector update this pass.

SPACECRAFT Okay, thank you.

PAO This is Mission Control Houston at 3 days 7 hours 14 minutes, mission elapsed time on the 54th orbit. We just passed out of range of the U.S. tracking stations and we have a long loss of signal period for about 34 more minutes. Crew is going back to their activities with the Electromagnetic Interference search, using the payload arm and the Plasma Diagnostic Package, when they finish that activity they will be reberthing the PDP in the payload bay and shutting it down for the evening. And word was passed up to them from the ground that the payloads people and the remote manipulator arm people gave them their thanks for a good day of hard work. At 3 days 7 hours 15 minutes mission elapsed time this is Mission Control Houston.

CAPCOM Columbia, Houston back with you through Botswana for 4 and 1/2 minutes, over.

SPACECRAFT Okay, we're holding up on the berthing until Jack gets his COAS calib done. We're getting a delta bias of .48.

CAPCOM Copy, .48.

END OF TAPE

PAO ...reach of the Botswana tracking station and it'll be almost half and hour again before we reacquire Columbia over Guam. It's getting to that time of day where the orbit track has precessed westward and misses an awful lot of the tracking stations at this time of day and we end up with very long loss of signal periods. Gordon Fullerton indicated that they were proceeding with the plasma diagnostic package EMI search that is a moving of the plasma diagnostic package detection equipment to various locations around the vehicle to determine what is the type and the range of the electromagnetic interference around the spacecraft generated by the S band equipment, the communications equipment and various other things that produce that type of electromagnetic field. At 3 days 6 hours 18 minutes Mission Elapsed Time, this is Mission Control Houston.

PAO Mission Control Houston, 3 days 6 hours 45 minutes Mission Elapsed Time. We're about to reacquire briefly over the Guam tracking station in about 10 seconds or so.

CAPCOM Columbia, Houston through Guam for four minutes over.

SPACECRAFT Okay Sally we've completed sequence 4 there. We're getting set up for sequence 5. Two or three times during that run the PDP high voltage tripped off and I kept resetting it. Does that figure?

CAPCOM Standby Gordo.

SPACECRAFT Right now it's tripped off and I have not reset it till I talked to you.

CAPCOM Columbia, Houston. The only thing we've got left today is the EMI search and we suggest you not bother resetting the high voltage any further. It appears to be tripping off when you go through the electron beam.

SPACECRAFT Okay it was tripping off even when we were way up here toward the nose no where near the beam.

CAPCOM Roger. Thank you.

PAO Mission Control Houston 3 days 6 hours 49 minutes Mission Elapsed Time. Pass out of range of the Guam tracking station and be about another 17 minutes before we reacquire briefly over the western United States. The crew is still performing several of the steps in the electromagnetic interference search using the plasma diagnostics package. And that will probably continue for about another 20 minutes or so before they are ready to put the payload away back in the back to reberth it back in the payload bay and latch it down for the night. 3 days 6 hours 50 minutes Mission Elapsed Time.

CAPCOM Columbia, Houston we're 30 seconds to LOS. Stateside is next at 707.

HOUSTON Buckhorn COMTEC, Houston COMTEC air to ground one.

BUCKHORN Buckhorn COMTEC you're loud and clear.

HOUSTON I read you same Buckhorn. Go to air to ground two Houston air to ground two.

BUCKHORN You're loud and clear.

HOUSTON Okay I'll give you key and modulation simo on one and two.

BUCKHORN Okay standby and let me check to see if we got a carrier.

HOUSTON Okay.

BUCKHORN Houston COMTEC, Buckhorn COMTEC go ahead.

HOUSTON All right.

(test)

HOUSTON Standby Buckhorn.

BUCKHORN Roger, I wondered what happened.

PAO Mission Control Houston 3 days 7 hours 7 minutes Mission Elapsed Time on orbit number 54. We're about to pass very briefly over the outter range of the western United States tracking station. Standing by for voice contact momentarily.

CAPCOM Columbia, Houston back with you through the states for 6 minutes over.

SPACECRAFT Okay Sally. We're holding at let's see 133 right now for this pass. If you can whip up some TV quick, we turned on the elbow camera and we have an extreme good closeup view of the missing tile on the nose from here.

CAPCOM Columbia, Gordo, we're not able to get the TV

END OF TAPE

SPACECRAFT Okay not in it yet.

CAPCOM And Jack it looks to us like the beam just went off.

SPACECRAFT They shut off that, it went off after the end of the 14 minute sequence it says here the high filament high voltage is still in progress.

CAPCOM Roger, we think the sequencer turn the beam off.

SPACECRAFT Say again.

CAPCOM We think that that sequencer turned the beam off, it'll come back on in about 5 minutes.

SPACECRAFT Okay, How about a recycle then

CAPCOM And Gordo, we got 1 and 1/2 minutes in this pass, I'd like to give you the AOS time for the EMI search.

SPACECRAFT Stand by

CAPCOM Okay and that'll be, you can copy that on page 2-25 of the PDRS checklist.

SPACECRAFT Okay go ahead.

CAPCOM Okay, Guam is the site, 0644. Next is Buckhorn, 0706.

SPACECRAFT Is that all?

CAPCOM That's affirm, and Columbia at this time we'd like you to exercise the FPEG safing procedure which is on flight supplement page 2-60, 6 0 of the PDRS checklist.

SPACECRAFT Okay, I already did that Sally, and I got filament high voltage and run all off.

CAPCOM Okay we copy, thank you Jack. And 20 seconds to LOS, Botswana's next at 6:15 and thanks a lot for the good show.

SPACECRAFT Okay we'll see you next pass.

CAPCOM Roger that.

SPACECRAFT Are you still taking TV or should I go ahead and turn it off Sally?

CAPCOM Jack we just lost TV, thanks.

PAO This is Mission Control Houston at 3 days 5 hours 49 minutes mission elapsed time. Just completed that pass over the United States for a long period of downlink TV. We'll be out of contact with Columbia now for the next 26 minutes as we swing all the way around down the southern tip of Africa, and the announcement earlier about the additional unscheduled video that had been downlinked and recorded over Hawaii, that video will not be replayed at this time. At 3 days 5 hours 49 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston 3 days 6 hours 14 minutes mission elapsed time. We're about to acquire signal over the Botswana station, just a very brief pass over the edge.

CAPCOM Columbia, Houston through Botswana for 1 minute, how do you read?

SPACECRAFT Okay Loud and clear, we're doing the EMI search, Sally.

CAPCOM Roger we copy Jack. And while at stateside pass we noticed that the temperature on the elbow camera was getting close to the upper limit, if you get that alarm you can shut it off, and if your not using the camera now go ahead and take it down now.

SPACECRAFT Okay, we'll turn off the elbow camera.

CAPCOM Okay good, we're 20 seconds from LOS and Guam is next in 1/2 hour.

SPACECRAFT We'll see you at Guam.

SPACECRAFT Sally, we noticed shortly after starting this EMI search pattern that the filament was on on the FPEG, and also the PDP high voltage tripped off, I reset the high voltage and the PDP is that the proper thing to do?

CAPCOM Stand by. That's affirmative Gordo, you did the right thing.

PAO Mission Control Houston, 3 days 6 hours 16 minutes mission elapsed time. Just had that very brief pass over the southern edge of the reach of the Botswana tracking station. It will be almost a 1/2 hour again before we reacquire Columbia over Guam, it's getting to that time where the orbit track has precessed westward and misses an awful lot of the tracking stations .....

END OF TAPE

CAPCOM Columbia, we've lost a picture through Goldstone. We'll pick it up when we acquire MILA.

SPACECRAFT ...took two trys to get it to go back on but it's on now.

CAPCOM Roger Gordo. It looked like it tripped off when it went through the beam again.

SPACECRAFT How are you doing with the TV Sally.

CAPCOM We should have it back in a couple of seconds Jack. I'll give you a call.

CAPCOM And Jack we've got a good picture now through MILA. We're looking at camera delta.

SPACECRAFT Sally, I got a suggestion.

CAPCOM Go ahead.

SPACECRAFT We have about 15 minutes here till the start of the EMI search. How would it be if I just take orbiter loaded control here and manually sweep back and forth across where we're guessing the beam is and take a little data.

CAPCOM Standby. Columbia, Gordo that sounds like a good idea. Why don't you press ahead.

SPACECRAFT Okay.

SPACECRAFT Okay now what Gordo's going to do is bring the plasma diagnostics package down near the electron generator. Electron generator if we have some particles near by ought to ionize some of those particles and draw the beam that we could see if there weren't no darkness. But, it ought to be able to detect that beam if he is able to locate it because it's related to the magnetic field. And we know about where the magnetic field is and I have some instruments that I can watch to see if he gets it.

SPACECRAFT Okay he's registering increase in the 1 kilovolt electron. Okay Gordo it's increasing now. Oh no it went away. You were in it now go back. Okay you're not in it yet.

CAPCOM And Jack it looks to us like the beam just went off.

END OF TAPE

PAO ...that's been going on for some time now and I believe Fullerton reported that that was nearly concluded. As we pass over the United States on orbit 53, the Columbia will be crossing the Texas coast. That should be in about 20 minutes and there is not a lot of cloud cover at that point and the vehicle will be passing about 5 miles north of the coastal town of Rockport. 3 days 5 hours 19 minutes Mission Elapsed Time, this is Mission Control Houston.

CAPCOM Columbia, Houston through Hawaii. How do you read?

SPACECRAFT Houston we had you....faded in the middle...

CAPCOM Roger Gordo, you're broken also.

CAPCOM Columbia, how do you read now?

SPACECRAFT Breaking up pretty bad Sally.

CAPCOM Roger we'll catch you at the states and that's at 5:33.

PAO Mission Control Houston 3 days 5 hours 26 minutes Mission Elapsed Time. Just bare contact with the Columbia on the outside range of the Hawaii tracking station. The UHF transmission was not very understandable as they went by the edge of that boundary and they will be passing beginning a pass over the western United States in about 6 1/2 minutes. 3 days 5 hours 27 minutes Mission Elapsed Time this is Mission Control Houston.

PAO This is Mission Control Houston at 3 days 5 hours 32 minutes Mission Elapsed Time. We're about to pass over the western United States where we will have some live downlink television. Primarily inside the cabin as well as the beam search activity going on with the remote manipulator arm. After that there will be some unscheduled video downlinked which had been downlinked and recorded over Hawaii as the crew passed over that general area and that will probably be of preparation for the beam search activity being conducted now. Standing by for acquisition of signal over the western United States. This s Mission Control Houston.

CAPCOM Columbia, Houston through Buckhorn.

SPACECRAFT Hey Sally, we're working along through the sequence A right now.

CAPCOM Roger that and we'll be getting TV when we acquire Goldstone in 30 or 40 seconds and I have a few notes for you when you've got a chance Gordo.

SPACECRAFT Just a minute, we're standing in the middle of it here.

CAPCOM That's fine, whenever it's convenient and we are getting TV now. Really nice shot of the arm.

CAPCOM And we see you going over the coast of California.

SPACECRAFT Okay.

SPACECRAFT Got the flight deck camera set up so, not that it's anything to recommend in the way of a scene, but you can select it if your interested.

CAPCOM Roger we're looking inside right now.

SPACECRAFT ...down there how are you?

CAPCOM Pretty good, like your bumper sticker.

SPACECRAFT Wait till you see this one.

SPACECRAFT I don't know if you can see that one or not Sally. It says Marines since 1775 unhampered by progress.

CAPCOM Chalk one up for the PLT.

SPACECRAFT He'll get his later.

SPACECRAFT ...closer eye on the PDP high voltage so far it's hanging in there.

CAPCOM Roger. And Gordo we can see your equal time bumper sticker by the Mission Timer.

SPACECRAFT Roger.

SPACECRAFT They told him if he joined the Air Force he'd rise to great heights.

SPACECRAFT Right now Sally it looks like you're looking at the IECM the induced environment contamination monitor from Marshall Space Flight Center. Now you're looking down on the whole payload. Looks like now you're looking back up at the PDP, as it's making it search across the spacecraft for it's the electron beam. You guys sure jump around with that camera don't you.

CAPCOM We're trying to stay one step ahead of you Jack.

SPACECRAFT Keeps you a little busy right here in the cock...
END OF TAPE

CAPCOM Columbia, we're 30 seconds to LOS, Guam is next at 5 plus 10.

SPACECRAFT Okay.

PAO This is Mission Control Houston at 3 days 5 hours 4 minutes mission elapsed time. On that pass over Yarragadee, Gordon Fullerton reported that he has begun the maneuvering the remote manipulator arm through its planned sequence of attitudes and positions in attempting to locate the beam projected by the vehicle charging a potential experiment and determining how that beam is deflected by the plasma wake created by the orbiter. We'll be reacquring Columbia in about 6 minutes over the Guam station. 3 days 5 hours 4 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston, standing by to reacquire signal through Guam.

CAPCOM Columbia, Houston through Guam for 6 and 1/2 minutes.

SPACECRAFT Okay Sally, just happened to notice that the PDP high voltage talk back went barber pole I'm not sure exactly when but I looked over there about 30 seconds ago and it was.

CAPCOM Roger, we copy Gordo. Let us look at it for a minute. Columbia, Houston, we think what happened with the high voltage talk back is that when you got the PDP in the beam the beam just tripped it off, there's a procedure you for to reset the high voltage on page 2-54 of the PDRS checklist.

SPACECRAFT Okay, we're at the end of a sequence and I'm almost out of time so I'll have to watch it close the next time, I was aware of that but not sure how long, does it have to be done immediately upon will we notice when it trips off?

CAPCOM That's affirmative Gordo, as soon as you notice, it be a good idea to do it, and for your information we saw this happen earlier in the day and it automatically reset then, but now your in control of it.

SPACECRAFT Okay.

CAPCOM Columbia Houston, when there's somebody down on the middeck there's a teleprinter message we just sent up to you.

SPACECRAFT Okay, I heard it.

CAPCOM Columbia, with a minute 15 seconds left in Guam pass, we've got one more trick up our sleeves to try and get the camera Bravo zoom back.

SPACECRAFT Now is a good time to try it.

CAPCOM Roger, what we'd like you to do is turn the power off for ten seconds then back on which we did before, and then we'd like you to try and hold the focus to far for at least 30 seconds while your simultaneously holding the zoom in and the hope is that the vibration of the focus driving into the stop will vibrate the zoom, the zoom motor.

SPACECRAFT Okay, I'll try that.

CAPCOM Columbia, we're at 20 seconds to LOS, we may pick you up briefly UHF only over Hawaii if not, we'll see you stateside for some live TV.

SPACECRAFT Okay, we'll see you either place.

PAO Mission Control Houston at 3 days 5 hours 17 minutes mission elapsed time. Just had loss of signal through the Guam tracking station. And there's a possibility we may have a minute worth of voice contact as we pass on the outside edge of the Hawaii station. And then begin a track of the United States. Gordon Fullerton was just about to begin a trouble shooting procedure on one of the payload bay cameras that experienced a failure in its zoom mechanism earlier and he will proabably be working on that momentarily. They have also been conducting continuation of the vehicle charging and potential beam search that's been going on for some time now and I believe Fullerton reported that was nearly concluded. As we pass over the United States on orbit 53 the Columbia will be crossing the..

END OF TAPE

CAPCOM Okay, sounds great, we'll plan that for sometime later in the flight.

PAO Mission Control Houston. 3 days 4 hours 34 minutes mission elapsed time. Just passed out of range of the Ascension Island tracking station and we'll have a brief pass over Botswana in southern African in about 5 and 1/2 minutes. Crew still has about 20 minutes left in their meal period and then we'll begin some of their remote manipulator arm plasma diagnostic package activities.

CAPCOM Columbia Houston through Botswana for 3 minutes, over.

SPACECRAFT Okay, we're with you at Botswana.

CAPCOM Roger, Jack, in reference the TV the next stateside TV pass. We've been talking it over and we'd like to make it your choice what you show us either a tour of the bay which should be fine, or a combination of inside views and PDP operations as was originally scheduled, or if you'd like we can run the cameras from the ground.

SPACECRAFT Okay, why don't we just take the combination, I don't think we can amuse you with inside the the cockpit for 10 minutes. Maybe we can do that for a few minutes and head outdoors and we can look at the experiments.

CAPCOM Okay, that sounds good.

SPACECRAFT Kind of depends on how busy we get inside. I'm going to be assisting here and we'll have to play it by ear, I guess.

CAPCOM That's fine and if you change your mind or have any changes to the plan just let us know and we'll take care of it.

SPACECRAFT Okay, super.

CAPCOM Columbia, we're 1 minute to LOS. Yarragadee's next at 458 and Jack, we noticed that after the OPS mode recall a little while ago. We still need to get the star trackers back to the track mode and resume spec 21.

SPACECRAFT Okay, I'll take care of that and there's a message 22 reply on the recorder.

CAPCOM Roger, we copy that, and Jack, we'll also need to have you cycle the shutters and do you have a time for when you started the response?

SPACECRAFT Yea just after we left Ascension.

CAPCOM Roger, thanks a lot, we'll get that.

PAO Mission Control Houston at 3 days 4 hours 43 minutes mission elapsed time. Just passed out of range of the Botswana tracking station and we'll be reacquiring again briefly over Yarragadee about 14 and 1/2 minutes. Crew is due to resume their remote manipulator arm activities in about 15 minutes at the end of the scheduled meal period. 3 days 4 hours 44 minutes mission elapsed time this is Mission Control Houston. This is Mission Control Houston at 3 days 4 hours 57 minutes mission elapsed time. In about 1 minute we will be passing over the Yarragadee station in western Australia. Very shortly the crew is scheduled to begin the activities involving the vehicle charging and potential experiment using the plasma diagnostic package mounted on the end of the remote manipulator arm and maneuvering that arm through a set series of motions in order to determine where it encounters the beam set up by the vehicle charging and potential experiment. This is to help determine the effects of the plasma wake on that beam as the Orbiter passes through this area. Should be acquiring communications in about 10 seconds. This is Mission Control Houston.

CAPCOM Columbia Houston through Yarragadee for 5 minutes, over.

SPACECRAFT Sally, we're just checking the wrist roll. Had to go all the way around to get the wrist roll right. Getting to press on with sequence E.

CAPCOM Roger, sounds like you're right on time.

SPACECRAFT Okay, Sally, we can see the filament loud and clear but no beam and we're starting from 177 heading for 178 now.

CAPCOM Roger, Gordo, we copy. Columbia, we're 30 seconds LOS. Guam is next at 5 plus 10.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT (garble) the heartland of America and all the many farmers fields that take good care of us.

CAPCOM Roger, Jack.

SPACECRAFT Well, we just crossed the Mississippi River Sally. Looks like, there's a lot of weather over the country today.

CAPCOM You've probably got the best view of it Jack.

SPACECRAFT Yea, there's no trouble with the air traffic control up here either.

CAPCOM Roger that.

SPACECRAFT No traffic controllers. Looks like we're just going south of Atlanta and crossing the coast somewhere along the Carolinas.

CAPCOM Roger. And Jack, for your information, next stateside pass you'll be coming directly over Houston and it looks like the weather's clearing out a little here, you may be able to see us.

SPACECRAFT Okay, get out in the rought and way and I'll take your picture.

CAPCOM It's a deal. Columbia, we're 30 seconds LOS. Ascension's next in 10 minutes.

SPACECRAFT Okay.

PAO Mission Control Houston at 3 days 4 hours 18 minutes mission elapsed time. Just passed out of range of the continental United States tracking stations and have are crossing out over the Atlantic Ocean at the present time. Be coming within range of the Ascension Island tracking station in about 10 and 1/2 minutes. Been a slight swap around in the crew timeline. The crew when they had been earlier scheduled to have their meal about to begin that about an hour about an hour and 1/2 ago ended up continuing on with some work. And the meal period is now set for the current hour 3 days and 4 hours to 3 days and 5 hours mission elapsed time. After which time they will be operating the plasma diagnostic package with the vehicle charging a potential experiment in a activity to detect the condition of the environment around the Orbiter. 3 days 4 hours 19 minutes mission elapsed time. This is Mission Control Houston.

CAPCOM Columbia Houston through Ascension for 5 minutes, over.

SPACECRAFT Okay, we're still cruising along same altitude and air speed.

CAPCOM We're glad to hear that.

SPACECRAFT I take it that the recorders are running so that I can answer a question you had related to message 22 after Ascension.

CAPCOM That's affirmative, Jack, the recorders we will be recording voice. Columbia, we're 30 seconds to LOS. Botswana's next at 440 and Jack, just a reminder to record voice, you need to have the ICOM A on.

SPACECRAFT Okay, understand the next pass over the states will be a TV pass of inside the cabin while we're doing the PDP VCAP, is that correct?

CAPCOM That's affirmative, Jack, and we'll be getting both Goldstone and Mila.

SPACECRAFT Okay, then at some later date you wish to do so I'm prepared to give you a tour of the instrument back of the payload bay from the elbow camera.

CAPCOM Hey, sounds great, we'll plan that for some time later in the flight.

PAO Mission Control Houston. 3 days 4 hours 34 minutes mission elapsed time. Just passed out of range of the Ascension Island tracking station and we'll

END OF TAPE

CAPCOM ..Rush into the joint VCAP PDP beam search, we're willing to slide that and let you get some lunch.

SPACECRAFT Okay, we'll call you back.

CAPCOM Roger.

SPACECRAFT We are now at the wake stand by point.

CAPCOM We see you there. And Gordo, that's a fine place to leave the arm, just let it sit there and collect data.

SPACECRAFT Thank you.

CAPCOM Columbia, we're 30 seconds to LOS stateside's next in 3 minutes.

SPACECRAFT Okay, be there in 3 minutes and we sure need to have perfect attitude for this VCAP PDP beam search coming up I think, so if you gotta crank it up, why let me know.

CAPCOM That's affirm Jack, and we think your attitude looks good.

SPACECRAFT ..thanks.

PAO Mission Control Houston 3 days 3 hours 56 minutes mission elapsed time. They have loss of signal through the Hawaii station then we'll be reacquiring in the pass over the United States in about 2 minutes and 45 seconds. This is Mission Control Houston at 3 days 3 hours 58 minutes mission elapsed time. On that recent pass over the Yarragadee tracking station in Australia the crew had a medical conference with the surgeon and following that conference the surgeon has reported that the conference related to a request from Gordon Fullerton who reported a feeling of fullness in his abodomen due to gas, and ask the surgeon what in the medical kit he could use, the surgeon recommened that he use the Milanta which is carried onboard the Shuttle medical kit. 3 days 3 hours 59 minutes mission elapsed time, this is Mission Control Houston.

CAPCOM Columbia, Houston back with you through the states.

SPACECRAFT Roger.

CAPCOM And Gordo, we have an update to the RMS PDP Ops for the afternoon, we'd like you to delete run number 1 in the joint beam search.

SPACECRAFT delete say again?

CAPCOM Roger, we'd like you to delete run number 1 in the

joint VCAP PDP beam search and stay in the PDP wake stand by attitude until run number 2 which occurs at 0500 hours.

SPACECRAFT Okay, this is start run number 2 at 0500, and delete number one.

CAPCOM That's affirmative, just delete number one.

SPACECRAFT Okay, and let us know when your ready for the television.

CAPCOM Columbia, Houston it looks like we made a mistake down here, we believe that the TV is scheduled for the next state side pass one rev from now, rather than this pass and we apologize if we mixed you up.

SPACECRAFT Oh, no problem we were kind of worried about that too, but we're just gliding over San Francisco right now and its a little cloudy south of Frisco but pretty nice in the San Joaquin Valley.

CAPCOM Oh, I'm sorry we're missing the view.

SPACECRAFT We've got the TV up and running if you wanna take it.

CAPCOM I'm afraid that the ground station's not configured for TV, we're dumping the recorders now.

SPACECRAFT Alright.

SPACECRAFT Okay, now we're going over to Lake Powell, famous place of friends of mine from Phoenix, good fishing, (kind of wispy) clouds over in area that way today, but it sure is a beautifully painted desert.

CAPCOM Roger Jack, and I think Joe Henry's listening too, and he probably agrees with the good fishing.

SPACECRAFT Well we just came over the Continental Divide Sally, looks like we're heading through Eastern Colorado and right across the heartland of America and all the many farmers' fields that take such good care of us.

CAPCOM Roger, Jack.

END OF TAPE

CAPCOM 40 seconds left here and we're coming up on Botswana at 304. That'll be 4 minutes.

SPACECRAFT Okay, and Gordo's got the PDP in the standby position.

CAPCOM Roger.

PAO Mission Control Houston. 3 days 3 hours 0 minutes mission elapsed time. Just passed out of range of the Ascension Island tracking station and will reacquire in about 3 and 1/2 minutes at Botswana.

CAPCOM Columbia Houston through Botswana for 6 and 1/2 minutes.

SPACECRAFT Okay, we've got you in Botswana.

CAPCOM Roger, Jack, and the answer to your question on the attitude and the roll. Looks like to us the roll is a little bit off but it's drifting back in the right direction and we think that it's fine. No need to tweek it up. Columbia Houston, we're 40 seconds till LOS. Yarragadee's next at 324.

SPACECRAFT Okay, Sally, did you copy our request for a medical conference?

CAPCOM Uh, negative, say again.

SPACECRAFT If you can can you set up a medical conference for that pass.

CAPCOM That's affirmative, we can do that.

SPACECRAFT Okay, appreciate that. Other question was later after lunch we have the PDP wake standby plus or minus 10 minutes of orbital noon. Can you get me a good time for this day?

CAPCOM Good catch, Gordo, we'll do that.

PAO This is Mission Control Houston at 3 days 3 hours and 12 minutes mission elapsed time. We just passed out of range of the Botswana tracking station and we'll be coming up over Yarragadee in about 12 minutes where there will be a private medical conference between the crew and the surgeon here in Mission Control. Crew is scheduled to be having their noon meal right about now. And we're in the 51st orbit just having passed over the southern tip of Africa. 3 days 3 hours 12 miniutes mission elapsed time and this is Mission Control Houston. Mission Control Houston. 3 days 3 hours 25 minutes mission elapsed time. We are within range of the Yarragadee tracking station now where the crew is scheduled to have a private medical

conference with the surgeon in Mission Control. Mission Control Houston at 3 days 3 hours 49 minutes mission elapsed time. We'll be reacquiring signal with Columbia over Hawaii in about 20 seconds.

CAPCOM Columbia Houston through Hawaii for 5 and 1/2 minutes.

SPACECRAFT Okay, we're with you in Hawaii Sally.

CAPCOM We're with you, Jack, and a piece of information that Gordo requested. Noon on this orbit is at 0403.

SPACECRAFT Okay, I got it. Sally, if we're interpreting the checklist right, we need to get to the wake plasma right now, is that correct?

CAPCOM Standby, Gordo. That's affirmative, Gordo, we'd like you to start there now.

SPACECRAFT Okay.

CAPCOM Columbia, we're not receiving S-band downlink. We'd like you to check the configuration of your ATU's.

SPACECRAFT Okay that ought to be better now.

CAPCOM Okay, thank you. Columbia Houston, we want to make sure that you've had a rev or so of relaxation and a time to prepare and eat a meal. If you haven't there's no reason to rush into the joint VCAP PDP beam search. We're willing to slide that and let you get some lunch.

END OF TAPE

SPACECRAFT Was that better Sally?

CAPCOM That's real nice Jack.

SPACECRAFT I'm just trying to calibrate this thing, so you need to tell me when it's good and when it isn't.

CAPCOM Okay, it's over driven just a little bit.

SPACECRAFT How's that?

CAPCOM Try it again Jack.

CAPCOM Jack, we're over ...

SPACECRAFT (garble)

CAPCOM We're over a UHF site now it may be better over S-Band, we can hear it, but it's hard to make out.

SPACECRAFT Okay, I kind of like that too.

CAPCOM Okay, we're coming up on Ascension in about a minute and a half, if you'll wait till then and shoot it to us again.

SPACECRAFT Okay, this is one of the most spectacular sights, flying around the world I think, that were looking at now. We're moving into the darkness and the edge of the, the rim of the earth is very poorly defined, it's, it goes gradually from very dark blue of the Earth and fades into black but there is no real definition, it's kind of like your going out into nowhere, and it's one of the most interesting contrasts I've seen.

CAPCOM And we're over Ascension now Jack, we've got S-Band.

SPACECRAFT Okay, I was just describing how we're moving into the darkness, here below us in dark. However, we can see the sun shining on the, some of the build up clouds on the other side, kind of reddish in color but we are finding it's not very well defined it is a very poor gradation between what you see on the Earth and then the blackness of space, it kind of, I guess you might say lonely feeling or a feeling of not knowing exactly where your going because you can't define the edge of the Earth or see any stars yet.

CAPCOM That's an interesting observation Jack, sounds like a beautiful sight.

SPACECRAFT And I don't have a song called blue Ascension, but let's try to calibrate this thing one more time.

CAPCOM Okay, go ahead. And Jack, even though we're getting S-Band data we're not getting S-Band voice, you might check your comm configuration, your coming down UHF only on voice.

SPACECRAFT Well okay, we're air ground one. Must be on the ground Sally.

CAPCOM Roger, we'll look.

SPACECRAFT You interested in any of those B-Field numbers that we copied down?

CAPCOM Stand by. Yes Jack, we're interested in those, you could send them down.

SPACECRAFT Okay, now I'll copy down the V-Mag, Y-Mag and X-Mag in that order.

CAPCOM Roger, we got a minute and a half.

SPACECRAFT Okay, this will be easy. .93 high and low was the same, 55,42,37, .94 58,44,39, 195, 58,47,43 .96,60,48,45.

CAPCOM We got that Jack, thanks a lot.

SPACECRAFT Okay, and I'm not totally happy with the roll attitude I think it's few degress off if you'd like to correct it I'd be willing to do that.

CAPCOM Okay, let us look and we may give you an update at Botswana, we got 40 seconds left here and we're coming up on Botswana...

END OF TAPE

CAPCOM their data. And Columbia, Gordo, just for our information, we're you able to regain the zoom on camera bravo?

SPACECRAFT (garble) here we go though from point 93 in automatic sequence onto the next point, point 94, you can see it sliding to the point side of the vehicle. In answer to your question was negative, it seems to be hard broke.

CAPCOM Roger, we copy, and we're getting a good view of the arm in motion.

SPACECRAFT Okay, there's another inside of the payload.

CAPCOM Roger, and we'll have TV for about 1 more minute.

SPACECRAFT A good number of the experiments on this flight are designed to quantify the atmosphere around the Orbiter so that future experimenters can better calibrate their instruments so they'll know what to plan on in terms of electrical potential on the Orbiter and the contaminants in the environment around it. As well as the thermal properties of the Orbiter, so it will be able to determine how a good an experimental platform it really is. So that's why we have most of the experiments on here this flight although there are others that are involved with basic research. The PDP that Gordo is moving right now is moving surrounding the finding out the fields of electromagnetic radiation around the Orbiter so that we'll be able to track them and know where they are and what kind of interference might be involved in the working some of the experiments in the future.

CAPCOM Roger, Jack, and the experimenters say that they're getting some real interesting data. And Jack, we're loosing the TV picture now. We'll be with you for another 3 and 1/2 minutes through Bermuda but no longer have live TV. Thanks a lot.

SPACECRAFT Okay.

CAPCOM And Columbia, we've got no more notes for you this pass, but we're interested in hearing what's for lunch.

SPACECRAFT What are you interested in hearing?

CAPCOM Roger, Gordo, we were just looking at the menu down here and wondering what's for lunch.

SPACECRAFT Well, we haven't had time to look yet, but we're going to very soon, says here.

CAPCOM Okay, our burrito order just come in here to the MOCR so we'll be enjoying lunch with you.

SPACECRAFT Okay, why don't you have one for us too. That's one thing they don't include in our menu.

CAPCOM That may be lucky. Columbia, we're 40 seconds to LOS. Dakar and Ascension are next at 249.

SPACECRAFT Okay.

PAO Mission Control Houston. 3 days 2 hours 45 minutes mission elapsed time. Just passed out of range of the pass over the states. Be reacquiring in about 4 minutes through Dakar on the 51st orbit. During that last pass we had live downlink television of RMS operations. At 3 days 2 hours 45 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston. 3 days 2 hours 49 minutes. Standing by for acquisition of signal through Dakar in about 10 seconds.

CAPCOM Columbia Houston, back with you through Dakar and Ascension for 10 minutes.

SPACECRAFT Okay, we're with you, Sally, forgot to mention that we had several spec 88 thermal EVAP messages I think they're related to the temperature going low on the heaters. I guess you presume that was going to happen when we turn them off, right?

CAPCOM That's affirmative, Jack, we apologize for those. We got a little bit ahead of ourselves and had you turn the heaters off before we had sent up some TMBU's to readjust the limits.

SPACECRAFT Okay, well they're sitting with down arrows and offscale loads right now. I'll just leave them as is, huh?

CAPCOM That's affirmative. There's no action required on your part. And we have no messages for you this pass. We'll just sit back and let you enjoy lunch.

(MUSIC)

SPACECRAFT Is that better Sally?

END OF TAPE

SPACECRAFT ..about right.

CAPCOM Okay. And Jack, we think you can start it now.

SPACECRAFT Okay.

CAPCOM Columbia, for your information we're about 3 minutes from Mila acquisition and I've got some S take start times to read up that you copy in the PDRS checklist, if you've got that handy.

SPACECRAFT ..... again Sally.

CAPCOM And that's on page 2-51 of the PDRS checklist.

SPACECRAFT Okay, I'm looking at 2-51 Sally go ahead.

CAPCOM Okay, I'll read you the times first, they'll all on day 3. Run number 1 is at 0435, run number 2 at 0500, run number three at 0531, run A all three are sequence 8, run B Bravo are all three sequence 9, the VTR is required on numbers 1 and 2 only.

SPACECRAFT 435, 500, and 0531, sequence A is sequence 8, and B is 9 and 1 and 2 is requiring VTR.

CAPCOM That is a good read back. And Jack we'd like you to be using camera Alpha for those rather than camera Delta, we think we can get better pictures with the black and white camera.

SPACECRAFT Okay.

CAPCOM Columbia, Houston we're over the White Sands S-Band station right now, we'd like to get a voice check if we could.

SPACECRAFT Okay, short term follows 1,2,3,4,5,4,3,2,1 how do you read through White Sands?

CAPCOM Loud and clear Jack, and we're on Mila now and getting good TV.

SPACECRAFT Okay.

CAPCOM And for your information we're looking at camera Delta. Looks real good.

SPACECRAFT Okay we're doing a .93 not quite, have tweak it up. Okay you want some voice on this Sally?

CAPCOM Sure, that it be great Jack.

SPACECRAFT Okay, Gordo's picked up the PDP, the Plasma Diagnostic Package you can see it there on the arm, and it's sort of resting just above the payload bay, I'll try to swing the camera down so that we don't get quite so much background in there, you can see more of the payload bay. Okay in the foreground big silver and gold and colored box that the thermal canister experiment and just ahead of that can see 2 solar experiments which will use on a point top to sun, the X-ray polarimeter and the solar radiants monitor. Would you rather have us to go the elbow cameras and take a look down?

CAPCOM It's your choice Jack, whichever you think would look good to us. And Jack this is really a fantastic shot.

SPACECRAFT Okay, there you have the elbow camera flying down the full parameter of the remote manipulator system and it's latched onto the PDP as you can see the circular thing at the very bottom of it, but down here in the payload bay, you can also make out the silver and goldene and color box which are thermal canister experiment on top of that there's a micro meteorite collector,

Okay, I interrupted Jack and put him to work, monitoring some of the scientific data that were supposed to get while were at this point. And as soon as he gets those numbers logged then were going to go move on in the sequence to a next automatic point.

CAPCOM Roger Gordo, the payloads people appreciate you logging their data.

END OF TAPE

CAPCOM Okay Jack and how about a roll of 300 that's 3-0-0 at 2 hours and 30 minutes.

SPACECRAFT All right, that sounds good. We'll go with that thank you.

CAPCOM Okay good.

CAPCOM And Gordo if it's convenient, we've got a quick troubleshooting procedure that you can try between Hawaii and the states to regain the zoom on camera bravo.

SPACECRAFT Okay.

CAPCOM Okay and that procedure will just be to turn camera bravo off o-f-f for 10 seconds, and then turn the power back on and try the zoom and see if that recovers it.

SPACECRAFT Okay.

CAPCOM And as far as the WCS is concerned, we thought about your idea of putting water into the slinger down in the WCS and we don't recommend that. We think that's not a good idea. We think that the bag that you probably have hung up in there is a cloth bag. It won't disolve in the water and that the water might just add to the problem. If the water freezes it could make the problem worse.

SPACECRAFT Okay.

CAPCOM And we've got 50 seconds left in this pass we'll talk to you at Buckhorn in 3 1/2 minutes and just a reminder on the TV, we may not have told you, we're scheduling the live TV for Mila only and I'll give you a call when we've got a good picture and we're locked up over Mila.

SPACECRAFT Okay. Roger.

PAO This is Mission Control Houston at 3 days 2 hours 23 minutes Mission Elapsed Time. We've had loss of signal through the Hawaii station. We'll be reacquiring through Buckhorn in about 2 minutes according to the timeline and the crew has been very closely adhering to the timeline. Col. Lousma is due to be preparing the meal while Gordon Fullerton continues with his remote manipulator system activities and mapping the plasma region around the orbiter with the plasma diagnostic package. 3 days 2 hours 23 minutes Mission Elapsed Time, this is Mission Control Houston.

PAO Mission Control Houston 3 days 2 hours 25 minutes. Standing by for reacquisition of signal over the United States. When we pass over the Mila tracking station, we will be

seeing some downlink television of the plasma diagnostic package operations. But, that will be sometime after we've already had voice contact over the western United States.

CAPCOM Columbia, Houston with you stateside through Buckhorn.

SPACECRAFT Okay, we've got you kind of weak.

CAPCOM Roger Gordo, you're loud and clear and the teleprinter message that we sent up over Hawaii was the entry weather.

SPACECRAFT Roger.

CAPCOM Columbia, we see that you're back in the 1GNC GPC configuration and you're go for the item 48s to SM and GNC anytime.

SPACECRAFT Thank you.

CAPCOM And Jack, just a reminder after the ops transition, we need to put the trackers back in the track mode and resume spec 21.

SPACECRAFT Okay.

SPACECRAFT I think we've got the wrong vector back there don't we. Don't we need body vector 2.

CAPCOM Standby. Columbia, Houston. We concur. It should be body vector 2.

SPACECRAFT And we're not quite going to make that roll angle that you wanted. You're going to have to shoot just a little further downstream and roll. You got another one.

CAPCOM Standby. Columbia, Houston. Jack, it looks to us like you're going to get close enough for the 2+30.

SPACECRAFT Okay.

SPACECRAFT Maybe I'll let it over roll just a little bit and then go AR to vernier and that'll be about right.

END OF TAPE

SPACECRAFT Okay I put a roll of angle of 90 in and I'm going to start it at the ascending node which will be 20847. Do you concur?

CAPCOM Jack, check the ascending node, that's for the wrong day.

CAPCOM And Columbia you can ignore evaporator messages.

PAO Mission Control Houston, 3 days 2 hours 1 minute Mission Elapsed Time. Just had loss of signal through Orroral Valley. We'll be reacquiring at Hawaii in about 15 minutes. Gordon Fullerton reported that he has completed the interaction tests between the remote manipulator system and the RCS. 3 days 2 hours 1 minute Mission Elapsed Time, this is Mission Control Houston.

PAO This is Mission Control Houston, 3 days 2 hours 15 minutes Mission Elapsed Time standing by in about 10 seconds for reacquisition with Columbia over Hawaii.

CAPCOM Columbia, Houston with you through Hawaii for 7 minutes over.

SPACECRAFT Okay we got you loud and clear, Sally.

CAPCOM You're loud and clear also, Gordo.

SPACECRAFT And if you don't have anything further to talk about for a moment we have something for you.

(HAWAIIAN MUSIC)

CAPCOM Aloha to you too Columbia.

(HAWAIIAN MUSIC)

CAPCOM Columbia, Houston we appreciate the music. We've got a couple of notes for you this pass.

SPACECRAFT We sure like the music. Did that come over modulated to you or was it about right.

CAPCOM A little over modulated but it was nice.

SPACECRAFT Go ahead with the notes.

CAPCOM Okay the first is we'd like tweak up your attitude a little bit. We think that at 2+20 that's in just a couple of minutes you ought to have a roll of 29.0 degrees.

SPACECRAFT Okay.

CAPCOM Okay. And the DAP should when you do that we'd like you also to change DAP A4 back to .135.

SPACECRAFT Okay.

CAPCOM And Columbia also just a reminder we'd like you back in the 1G2GPC configuration now that the PRCS test is complete.

SPACECRAFT Yeah I was about to do that when Hawaii got here.

CAPCOM Okay we understand.

CAPCOM And I've got a couple of words on the WCS.

SPACECRAFT I don't think I'm ever going to make that roll attitude in time. You'll have to give us one that's a little further downstream I think Sally.

CAPCOM Roger Jack, we'll work on that and we notice that you loaded 290 in the roll.

CAPCOM And, we'll give you something a little later this pass.

CAPCOM Columbia, Houston. Jack, we'd like you to recheck that roll that should be 29.0 rather than 290.

SPACECRAFT Okay. But that time has passed already so I'll have to have another one.

CAPCOM Roger.

CAPCOM Okay Jack and how about ...

END OF TAPE

PAO Way and is not being uplinked to the crew yet, but there has been some discussion that earlier that there might be water introduced into the toilet to see if that would free the tines that are partially blocked on the fan, on the slinger rather, and that problem is still being worked it is not recommended that the water be used as was suggested earlier. And it is probable that the system will continue to be used in the slow speed and then perhaps if it fails at some point during the flight that the back up system of waste containment would be initiated at that time. 3 days 1 hour 40 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston standing by for acquisition of signal through Yarragadee.

CAPCOM Columbia, Houston through Yarragade for 7 minutes, standing by.

SPACECRAFT Sally, we're working on column 3, it's quite a spectacular sight to see those bit jets of fire.

CAPCOM Roger copy, column 3.

PAO Mission Control Houston, 3 days 1 hour 52 minutes mission elapsed time. They currently have acquisition through Yarragadee but the mission control room is avoiding contacting the crew now, allowing Gordon Fullerton to continue concentrating on his task of proceeding with the remote manipulator arm interactions with the reaction control system. That is a check out to determine what the motion reactions are of the arm, when it is deployed with a payload attached, and the reaction control system jets are fired. Fullerton made a comment just a few moments ago that it was quite a spectacular sight to see those big jets fire, referring to the normal size reaction control system jets which other crew members in the past, particularly on STS-1 John Young referred to as like howitzers going off. Those jets are used to keep the attitude stable up in the Spacecraft and to maneuver it in its attitude while in orbit. 3 days 1 hour 54 minutes mission elapsed time, Mission Control Houston.

CAPCOM Columbia, we're 10 seconds to a 1 minute LOS over Australia.

PAO Mission Control Houston, 3 days 1 hour 58 minutes mission elapsed time. Brief LOS period here between Yarragadee and Orroral. There will be an informal science briefing in room 135 at 12:00, building 2, the press conference room, discussing the micro abrasion foil experiment and the induced atmosphere experiment. These will be local Houston area only and will not be carried on the NASA circuits. 3 days 1 hour 59 minutes mission elapsed time, this is Mission Control Houston.

CAPCOM Columbia, we're back with you for a minute and a half.

SPACECRAFT Okay Sally, we completed the test. We used camera Delta instead of Bravo, Bravo with its lack of zoom and looks like Delta had a lot better view on it, so we're looking at the dynamics, I hope that's okay for the data reduces.

CAPCOM That sounds fine Gordo, and I do have one note on the B-Field map coming up.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, we'd like you to start that at 0220, rather than when it's called out in the CAP, and that'll get it started before the stateside pass. And have it in work over the states.

SPACECRAFT Okay, start that at 0220.

CAPCOM That's affirm, that's about 20 minutes from now. And we're 20 seconds to LOS, Hawaii's next at 0215.

SPACECRAFT Okay. I put a roll of angle of 90 in and I'm going to start it at the ascending node which will be 20847, you concur?

END OF TAPE

CAPCOM Okay, the first is in regard to the GPC's After the PRCS interaction test we've changed our mind and we'd just as soon go back to the single G2 GPC OPS and that'll be when you finished with the RMS PRCS interaction test.

SPACECRAFT Okay, I'll do that.

CAPCOM And the other note has to do with the flash EVAPs. We haven't haven't used any water through the flash EVAPs the whole flight and we'd like you to get those off to save a little bit of power.

SPACECRAFT Okay, I think cryo A is the only one that's on, isn't it?

CAPCOM That's affirmative, what we'd like you to do is turn off flash EVAP controller primary A. Take that one off. And also on panel L1, the topping EVAP heater left nozzle, right nozzle and duct, all three to off. O F F.

SPACECRAFT Okay, all the evaporators and all of their heaters are off.

CAPCOM Roger, and both of those are just to we decided that there's no sense using up more cyro than we have to.

SPACECRAFT We're for that. I gave you a little bit of BFI tire pressure readout there, did you get it back there at the states?

CAPCOM That's affirmative, Jack, we got that.

SPACECRAFT Okay, I got it off again.

CAPCOM Roger. And Jack, just to verify the next live TV pass will be the next stateside pass and what we'd like on that is views the Orbiter bay and the PDP operations from the bay CCTV's and if you could operate those cameras for us while you're monitoring the auto sequences and may give us some visual tour of the bay and the PDP, we'd appreciate that.

SPACECRAFT Okay, you want us to operate both the elbow and the delta cameras, right?

CAPCOM Whatever views you think would be best.

SPACECRAFT Okay, and you're looking for RMS and payload bay.

CAPCOM That's correct and in particular the PDP.

SPACECRAFT Okay.

CAPCOM Columbia, we're 30 seconds LOS. Botswana's next at 1 plus 33.

SPACECRAFT 33.

PAO Mission Control Houston. 3 days 1 hour 22 minutes mission elapsed time. Just had loss of signal through Dakar. Be reacquiring in about 10 minutes over Botswana. Crew continues to be operating on a timeline perhaps a little bit ahead. 3 days 1 hour 23 minutes mission elapsed time this is Mission Control Houston.

CAPCOM Columbia Houston through Botswana for 3.

SPACECRAFT Okay, Sally, about time....

CAPCOM Roger.

SPACECRAFT Opening up the ICE for the interaction test now.

CAPCOM Roger, and we'll leave you alone. Columbia, we're 20 seconds LOS. Yarragadee's next in 14.

SPACECRAFT Roger.

PAO Mission Control Houston. 3 days 1 hour 38 minutes mission elapsed time on the 50th orbit. Columbia's just passed out of range of the Botswana tracking station. And Gordon Fullerton reported that he is about to proceed with the remote manipulator arm reaction control system interaction test. During that test the major purpose of that is to see how the arm reacts when it is extended and loaded and the reaction control system jets are fired. The arm is maneuvered to a prescribed location and then both the normal and vernier jets are used at different times and the reaction of the arm is observed to see how it is affected by the firing of these reaction control jets. There is some discussion underway as to the possible remedies or the mode of operation for the waste containment system and that is currently underway and it's not been uplinked to the crew yet but there has been some discussion that

END OF TAPE

SPACECRAFT What your looking at of course is the aft part of the Columbia, open payload bay, the Canadian built arm is bent back so that it has a camera on the elbow which is showing you the forearm and the wrist so to speak of the manipulator arm and with the Plasma Diagnostic Package on the end of it. And down in the payload bay you see the other components of the OSS payload and the environmental contamination monitor there, course the tall vertical stem with the OMS maneuvering system pods on either side you can just see the very center engine valve that was used during the boost on either side of the arm you see two shiny objects those are the radiators that are helping to keep the Spacecraft cool, and of course the wing is right underneath that and the, you can see the inboard elevons right behind the radiator there are lifted up, apparently they shade part of the sunlight with a black strip along the trailing edge.

CAPCOM Roger Jack, sure is a nice machine, and we're talking to you through Bermuda now and no longer have a TV picture.

SPACECRAFT Wouldn't you know it.

CAPCOM Columbia, we're one minute to LOS, Dakar is next at 1 plus 15.

SPACECRAFT Okay 1 plus 15.

CAPCOM And thanks for the tour of the orbiter.

SPACECRAFT Okay, did you get any of the voice at all, with the TV or was it unavailable?

CAPCOM Jack, I think that'll make a great show, really went well.

SPACECRAFT Okay, if you remind us next time we'll give you some voice for this.

CAPCOM Roger, we'll do that.

SPACECRAFT And I understand this next pass over the states they're standing by for some in the cabin type TV, is that correct?

CAPCOM Standby Jack we'll check on that. And we'll give you an answer for that over Dakar in 5 minutes Jack.

SPACECRAFT Okay.

PAO Mission Control Houston, 3 days 1 hour 10 minutes mission elapsed time. Just passed out of range of the Bermuda tracking station. Over the states pass we had some very

interesting downlink television of the RMS deploying the Plasma Diagnostic Package with the Earth in the background. And Astronaut Jack Lousma was giving us a guided tour there a little bit belatetly after we had lost our television picture but nevertheless an interesting review of the type of things we had seen. We'll be reacquiring in about 4 minutes over Dakar on the western coast of Africa, Columbia now about mid way over the Atlantic Ocean in its 50th orbit on this

the 4th flight day, about 1 hour and 11 minutes into the 4th flight day. This is Mission Control Houston.

PAO Mission Control, 3 days 1 hour 15 minutes mission elapsed time. Standing by for reacquisition of signal with Columbia through Dakar.

CAPCOM Columbia, Houston through Dakar for 7 minutes, over.

SPACECRAFT Okay, we got you at Dakar.

CAPCOM We got you too Jack.

SPACECRAFT I guess that, in the cabin TV pass I was talking about not till 410 or 420 right in that neighborhood.

CAPCOM Roger Jack, I think the next stateside TV is gonna be PDP operations.

SPACECRAFT Right, I see it.

CAPCOM And Jack, over the states while we were operating the cameras for you, we had some trouble with camera Bravo, we couldn't get it to zoom, we wonder if you could try the zoom function on Bravo for us and find out whether you can control it.

SPACECRAFT Okay. That's a negative, I can pan and tilt but no zoom.

CAPCOM Roger, we copy. Columbia, I've got a couple notes for you this pass.

SPACECRAFT Okay, go ahead.

CAPCOM Okay the first is in regard to the GPCs....

END OF TAPE

PAO before we actually get it up and fly it. He noted that it was very smooth and there were no surprises, or if there were any surprises they were all pleasant. And capped off those comments saying that he was very impressed with that piece of machinery. CAPCOM Sally Ride also reported that the payloads people were saying we were getting very good data out of the plasma diagnostic package which is extended up into the wake, the plasma wake up around the Orbiter which the Orbiter creates as it moves through the ionosphere. 3 days 0 hours 30 minutes mission elapsed time this is Mission Control Houston. This is Mission Control Houston. We're about 50 minutes into the 4th day of the 3rd Space Shuttle flight and as we reacquire signal over the continental U.S. and in just about 30 seconds we should be seeing some very interesting downlink color television, about 4 minutes worth, of the remote manipulator arm attached to the plasma diagnostic package and extended out above the spacecraft as the PDP evaluates the electrical characteristics of the wake area around the spacecraft. Standing by for voice contact momentarily and the television will be coming a little while later.

CAPCOM Columbia, Houston's with you through Buckhorn.

SPACECRAFT Okay, loud and clear, Sally.

CAPCOM You're loud and clear also.

SPACECRAFT Noticed that he averages up to 58 now and 32 H is around 44 to 50 for the PDP troops.

CAPCOM Roger, we copy, and we'll start looking at that too. Columbia, Houston, we're looking at your thermal attitude here over the states. Looks like to us like we're going to need to tweak the roll angle a little bit and we think the best way to do that is to change the discrete rate in DAP A4 to .134 vice 135.

SPACECRAFT Okay, we'll do that right now.

CAPCOM Okay, good.

SPACECRAFT Okay, how do you like that?

CAPCOM Roger, Jack, that looks good to us. And we're 20 seconds to a short LOS over the states and we'll pick up live TV over Mila.

PAO Mission Control Houston. 3 days 1 hour mission elapsed time. We now have the television picture downlink showing the remote manipulator arm.

CAPCOM Columbia, Houston, we're back with you and we've

got live television now. We're looking at the PDP with yours in the background.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, we just had a super TV pass over Mila. We sure are envious of the view you guys have up there.

SPACECRAFT It's neat. Well it's a spectacular one. I wish we could've given you a little voice coverage. We were busy doing some other things but looks like it's kind of cloudy as we are at descending path out over the Pacific. (Garbled) out over the Atlantic heading out for the African continent. (garble)

CAPCOM Roger, Jack, and we did'nt want to bother you in what you were doing. And we've got another 3 minutes left in this pass.

SPACECRAFT Just turned on the tire pressure switches.

CAPCOM Roger.

SPACECRAFT What you're looking at, of course, is the aft part of the Columbia, open payload bay. The Canadian built arm is bent back so that it's as the camera on the elbow

END OF TAPE

CAPCOM Columbia, we're ten seconds to a short LOS over Australia.

SPACECRAFT (garble)

PAO Mission Control Houston. 3 days 0 hours 23 minute mission elapsed time. Passing through a gap here of no communications between the 2 Australian tracking stations and we'll be reacquiring in about a minute and 20 seconds over Orroral Valley. It was noted that as we have later planned in the flight plan for some video tape recorder playback that we will instead while passing over the U.S. opt for some live television downlink of the remote manipulator arm extended with the payload with the plasma diagnostic package attached to it an perhaps some good shots of the earth as well as we go by that ar that will be coming up in about 28 minutes from now. In the meantime, in about another 45 seconds, we'll reacquire communications over Orroral Valley. 3 days 0 hours 24 minutes mission elapsed time. This is Mission Control Houston.

CAPCOM Columbia Houston, we're back with you through Orroral Valley.

SPACECRAFT Go ahead.

CAPCOM And Jack, we think the cryo heater configuration looks good.

SPACECRAFT Okay, thank you. Sally, some general comments on the arm operation if anybody's interested.

CAPCOM Go ahead, I think there're a lot of interested people down here.

SPACECRAFT Okay, it's as close to the (garble) as it could be. The operation is smooth. There's definitely a little bit o flex in dynamics but in the (garble) mode that's very minimized. For instance, I've made some little message corrections centering the guides up in the slot before raising the arm and I was able to do that. Really no surprises. If there's any surprises they're all present. I am really impresse with that piece of machinery.

CAPCOM Hey, that's great news and we were impressed too. A piece of information that you might like. We saw when you wer when you were grappled to the to the PDP in the berth position the joint angles all matched very closely with the what we woul have expected from those digitals so that was good news too.

SPACECRAFT Alright, I noticed that too. The predicted was pretty close to the real Mccoy. I when we got the two grays I just made a little pitch maneuver right while

I was down at the bottom of the guides there and I got the B's micro switch to go gray and but the C I left it up and went barber pole and then I just made a little pitch back pitchdown and I got all three grades. Everything was absolutely straightforward as far as commanding response.

CAPCOM That's great, Gordo, and for your information the PDP is getting super data out there.

SPACECRAFT Alright.

CAPCOM Columbia, we're 30 seconds to LOS. Stateside's next at 0052.

SPACECRAFT See you back in the U.S.A.

CAPCOM Roger, and we'll be looking at live TV there.

PAO This is Mission Control Houston at 3 days 0 hours 29 minutes mission elapsed time. We just had loss of signal through Orroral Valley in eastern Australia. Passing out over the Pacific Ocean now and we'll be reacquiring over the United States in about 23 minutes where we expect to have some live television downlink showing the remote manipulator arm extended in space and holding onto a plasma diagnostic package. Gordon Fullerton who is operating the arm noted that it was as close tc the air bearing floor as it could be. Refering to the earth bound testing of the arm and its systems in one gravity where they use a very smooth precisely ground level floor to evaluate the operation of the arm on the earth. Not being able to evaluate it in 0 gravity before we actually get it up in flight. He noted that it was

END OF TAPE

CAPCOM Columbia with a minute 20 seconds left in this pass just a reminder that we're looking for the start of the cr H2 thermal test coming up in a few minutes, that'll be the take all the tank 1 heaters except H2 heater Bravo, H2 tank 1 heater bravo to auto, and the tank 3 and 4 heaters to off.

SPACECRAFT Okay, I got that from the, I got it written on m checklist that 1 five, is that okay? Or want me to do it now?

CAPCOM That's affirmative, we'd like to see that.

CAPCOM And Columbia, want to make sure that you understand that H2 tanks 1 and 2 should be heater Alpha only, a we're 10 seconds LOS Yarragadee's next at 00 plus 16.

SPACECRAFT Okay.

PAO Mission Control Houston, 3 days 0 hours 5 minute mission elapsed time. Pilot Gordon Fullerton continuing to go through a pre planned series of motions with the remote manipulator arm. With the Plasma Diagnostic Package attached t it. This is to conduct the loaded arm test, to evaluate how th arm performs with the payload attached to it. We'll be reacquiring signal in about 10 and a half minutes, 3 days 0 hou 6 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston, 3 days 0 hours 16 minut mission elapsed time. Standing by for reacquisition over Yarragadee in about 5 seconds.

CAPCOM Columbia, Houston through Yarragadee for six minutes, over.

SPACECRAFT Okay Sally, we got it out there in the wake stan by position right now.

CAPCOM Roger, Gordo, copy you're on the wake stand by position and we assume you finished the control system test.

SPACECRAFT Affirmative.

CAPCOM Roger, that's good work.

SPACECRAFT Wake parameters on spec 92 we averaged to hold i 32H, they're reading 371 and 35 respectively and none of them changed to any signficance moving from the original position out to the wake position, but I'll continue to watch'em.

CAPCOM We copy that Jack.

SPACECRAFT And if you'd take a look at the cryo heater configuration, might work on them a little bit.

CAPCOM Okay, we'll do that when we get data over Orroral Valley in about four minutes.

SPACECRAFT Sorry about that, I'll catch you on this business some day, when I become more qualified.

CAPCOM And Jack, we sent you state vector up over Indian Ocean last pass, and we noticed also over Indian Ocean that we'd like to have you put the star trackers back in the track mode and resume spec 21.

SPACECRAFT Okay, thank you.

SPACECRAFT Sally, I see you want according to our schedule to get a VTR playback of the PDP berths, did you get a chance to look at that when were doing it live, or do you still want the playback?

CAPCOM Stand by Gordo. Columbia, Houston that was a good catch Gordo we consider that we've seen the PDP berthing live over the last stateside pass, we don't need you to run the VTR playback for us. And we'll use that pass to get some live TV, we'll use the bay cameras we assume with the wake stand by going on you won't be needing the bay cameras and our inco will pan and tilt and give us some good shots of the arm in the wake stand by position and hopefully the Earth in the background.

SPACECRAFT Okay, I'll just stow this cassett then.

SPACECRAFT Okay, on the mid aft PDRS DAC we were unable to turn it off, and it just kept running and now it has reached end of its film, it says the switch is off, the lights are in run and end of film. It's my proposal that we pull the circuit breaker on that, what do you say?

CAPCOM Roger Jack, we understand that and we concur, pull the breaker.

END OF TAPE

PAO We'll be reacquiring signal in about 5 minutes. Just as we pass over the southwestern edge of the Madrid trackir station region on orbit number 49. 2 days 23 hours 37 minutes mission elapsed time this is Mission Control Houston. This is Mission Control Houston at 2 days 23 hours 42 minutes mission elapsed time. They're coming up on acquisition of signal on orbit 49 here as we pass over the outer limits of the tracking station at Madrid. There will be a playback very shortly of the television that came down live on the last pass over the continental U.S. Standing by for acquisition of signal.

CAPCOM Columbia Houston through Madrid for 3 minutes, over.

SPACECRAFT Okay, I got the PDP out in the breeze right now, but (garble) .

CAPCOM Roger, Gordo, copy the PDP's out.

SPACECRAFT (garble) a couple times of release, the first MET is released for 2309, the second one at 2339.

CAPCOM Roger, 09 and 39.

SPACECRAFT Okay, I notice that the current from the RDP is 34 but it 33, do you want us to proceed?

CAPCOM Standby.

SPACECRAFT (garble) it just turned to 33 and we're going o with it.

CAPCOM Roger, go ahead. Columbia, we're 50 seconds LOS. Indian Ocean's next in 15 minutes and Gordo, we'd like to collec some thermal data on the cameras during the day today and in order to do that we'd like you to leave the cameras powered up through most of the day. We'll give you a call when we're set t have you turn them off.

SPACECRAFT Okay, right now the OR except Charley you want it on?

CAPCOM Negative, we'd like you to leave Charley off.

SPACECRAFT I'm sorry, bravo, it's off also.

CAPCOM Okay, Gordo, we'd like bravo powered up and leave it on.

SPACECRAFT Okay, it's on also.

CAPCOM Roger, talk to you in 14.

PAO This is Mission Control. 2 days 23 hours 46 minutes mission elapsed time. Passed out of range of the Madrid station. We'll be reacquiring in about 13 and 1/2 minutes over the Indian Ocean station. Gordon Fullerton, who is operating th remote manipulator arm, noted at the beginning of this pass that the PDP is out in the breeze. Meaning that it has been deployed and it is out of the payload bay and is being held out in the area where the where it can do it's best job in evaluating the environment around the Orbiter. He noted that it was first released at mission elapsed time 23 hours and 9 minutes, rather days 23 hours and 9 minutes. And the crew has been instructed t leave the TV cameras powered up during most of the day to gather some thermal data on their operation. 2 days 23 hours 47 minute mission elapsed time this is Mission Control Houston. Mission Control Houston. 3 days 0 hours 0 minutes. Standing by for reacquisition through Indian Ocean station.

CAPCOM Columbia Houston through Indian Ocean for 4 minutes.

SPACECRAFT Okay, Indian Ocean, we're starting the control system here now in 1 and 2 GPC's OPS.

CAPCOM Roger, we see you in 2 GPC's and we copy your starting the control system evaluation.

END OF TAPE

PAO There was a decision made to go ahead and run those cameras, put them in the run mode as if they were actually acquiring data in the hopes that perhaps the run indication lights were malfunctioning in that that we may be acquiring some data after all. At 2 days 22 hours 57 minutes mission elapsed time this is Mission Control Houston.

PAO This is Mission Control Houston 2 days 23 hours 2 minutes mission elapsed time. We're about to reacquire Columbia over the U.S. and we're expecting some good downlink television of the first time that the remote manipulator arm has actually attached onto a payload and deployed it in space, should be getting that momentarily and the downlink television.

CAPCOM Columbia, Houston with you stateside, how do you read?

SPACECRAFT Okay, we're reading you loud and clear Sally. Th PDP has been unberthed it has been taken up the -Z axis and has been lowered down and we're ready to reprocess.

CAPCOM Okay, that sounds great Jack, and we should have live TV here in about 30 seconds. And Columbia, we're getting T now from camera Delta.

SPACECRAFT Okay. Are you getting a good picture on Delta Sally?

CAPCOM That's affirmative Gordo, we are. We're looking at the elbow camera right now, and now we're back on Delta.

SPACECRAFT Okay, Okay I'm slidding it slowly aft at this time.

CAPCOM Roger, we see that Gordo.

SPACECRAFT And now we're starting down.

CAPCOM Roger, looking good.

SPACECRAFT We got A and B gray with B still running full.

CAPCOM Roger, we concur.

SPACECRAFT Okay we got 3 grays. How bout that sports fans w got 3 grays.

CAPCOM Roger, and in record time.

SPACECRAFT Let's get it before it moves.

CAPCOM Roger that.

SPACECRAFT Okay we got it latched.

CAPCOM Roger Jack, we see it latched. And we're seeing super picture here.

STS-3 AIR/GROUND TRANSCRIPT t168j GMT 84:14:57 PAGE 2

SPACECRAFT Well Sally, I guess the first time you do that it has to be a record, I logged some 12 hours down of about 3 feet forward I started to watch it took six minutes to get in and get 3 grays.

CAPCOM Six minutes, we copy. Columbia we're losing the picture through MILA now we'll be with you through Bermuda for another 3 minutes.

SPACECRAFT Okay, we got some some 35s and some DACs also, we hope. There's a great contrast in the lighting and ver difficult to pick the right setting.

CAPCOM We understand that Jack, and we got super picture down here we really appreciate it.

SPACECRAFT Sally, how do you read me now?

CAPCOM Loud and clear Gordo.

SPACECRAFT Okay, I'm downstairs I just had to get a new battery for my wireless it just quit all of a sudden, I'm back with you now.

CAPCOM Okay. Columbia we're 40 seconds to LOS. Madrid next in 6 minutes, and just for information your interconnect looks good and so does your thermal attitude.

SPACECRAFT Okay.

PAO This is Mission Control Houston, at 2 days 23 hours 36 minutes, mission elapsed time. On that last pass over the United States we had the live downlink television of the first time that the remote manipulator arm has been used to grapple a payload and remove it from its latched position. And astronaut Gordon Fullerton performed those maneuvers with the a and that is scheduled to be going on a little bit longer, the crew is slightly ahead of the flight plan today. And the paylo was satisifactorily reberthed which is obviously very important has getting it unberthed. We'll be reacquiring signal in about minutes, just as we....

END OF TAPE

CAPCOM Roger stand by.

SPACECRAFT Okay, I went to stop on all three cameras and the run lights stayed on.

CAPCOM Roger, I'm not sure we understand, but we copy.

SPACECRAFT We've got a mutual sentiment on that one.

CAPCOM Roger. And Jack, we'd like to try running them a 24 frames per second for 15 seconds, and we're 20 seconds from short LOS over Australia.

SPACECRAFT Okay.

PAO Mission Control Houston, 2 days 22 hours 49 minut mission elapsed time. We have a short loss of signal period he between the two Australian tracking stations, be picking up aga at Orroral tracking station in about a minute and 40 seconds.

PAO Mission Control Houston, standing by to reacquire over Orroral.

CAPCOM Columbia, we're back with you for 4 minutes over Australia.

SPACECRAFT Okay, Gordo was lowering away on the RMS toward th PDP, and I did the test at 24 frames and second, and when I turned the cameras on the one light that was on went out, and then it started coming on very dimly and got a little bit brighter, a little bit brighter at the end of 15 second when I turned then all off the light then went off.

CAPCOM Roger Jack, doesn't sound like the DAC are working very well.

SPACECRAFT How about if I, you want me to not try to even run'em?

CAPCOM Stand by. Columbia, Houston, Jack it sounds like we've got film jammed in each of the cameras except the mid aft, we'd like you to run the cameras anyway per the checklist, and hope that we get some data out of them.

SPACECRAFT Okay, think I'd better run them at 612 or 24?

CAPCOM Stand by.

SPACECRAFT We got the arm down over the ten, it's looking pretty good here visually.

CAPCOM Okay good, and Jack we'd like you to run them per

the checklist, I believe its called out when we want either six frames per second or 24 frames per second in the PDRS checklist.

SPACECRAFT Okay, I'll do it as printed, just pretend like they'll all going.
STS-3 AIR/GROUND TRANSCRIPT t167j GMT 84:14:47 PAGE 2

CAPCOM That's affirms.

CAPCOM Columbia, Houston 30 seconds to LOS, for your information the fuel cell purge looked real good to us. And we'll be talking to you again over the states in half an hour with live TV.

SPACECRAFT Okay.

CAPCOM And Jack, just a reminder that if you have any problem with the PRCS we'd like you to recover with the vernier DAP.

SPACECRAFT Okay, we'll do that. And we got a capture of grapple.

CAPCOM Hey that's good news.

SPACECRAFT ...rigidized and and got all the nominal contact.

CAPCOM That's super and we're seeing the data.

PAO This is Mission Control Houston, 2 days 22 hours 5 minutes mission elapsed time. Just had loss of signal over Australia and we will be reacquiring in about 30 minutes over th Continental U.S. where we'll have a live television downlink. That will include RMS activities, currently Gordon Fullerton reports that the remote arm has been maneuvered into position an has captured and rigidized and grappled with the PDP which is th first time that we have used the arm and in that purpose and hav actually completed a capture and grapple. We should be seeing some television of that in about 30 minutes when we make a pass over the U.S. Commander Jack Lousma reports that he is doing some trouble shooting with the data acquisition cameras, and has gone through some tests running them in various speeds with the apparent result that only the mid aft camera is working properly. Flight Controllers suspect that film may be jammed in the other cameras, and there have been some peculiar signals on the run light indications and there was a decision made to go ahead and run those cameras, put them in the run

END OF TAPE

SPACECRAFT I'll read it to you if you want.

CAPCOM Roger, 21, 22, 30 Jack. And Jack, we've got the angles down here, there's no there's no need to read them down to us.

SPACECRAFT Okay. Cryogen cycle the gas heat relay 04.

CAPCOM Roger, and Gordo, we've taken a look at the data down here and you're go for the PDP on berth when you get ready for it.

SPACECRAFT Okay, we'll get to work on that.

CAPCOM Columbia, we're 40 seconds to Loss of Signal (LOS). Yarragadee is next in 9 minutes.

SPACECRAFT Okay, we'll see you there.

CAPCOM Columbia, going over the hill we see that you've got all of your Cathode Ray Tubes (CRT's) on SM, just a reminder.

PAO Mission Control Houston. 2 days 22 hours 33 minutes mission elapaed time. Just passed out of range of the Indian Ocean tracking station. Will be reacquiring in about 7 and 1/2 minutes through Yarragadee in western Australia. Fullerton reported that the remote manipulator arm has been uncradled and the ground controllers noted that the in the limp check test that all of the joints appear to be limp as as part of the test as they should be at this time and they will be proceeding shortly with the q-rthing and unberthing of the plasma diagnostic package as scheduled. 2 days 22 hours 34 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston. 2 days 22 hours 41 minutes mission elapsed time. Standing by to reacquire communication with Columbia over the Yarragadee tracking station in Australia.

CAPCOM Columbia Houston through Yarragadee for 7 minutes, over.

SPACECRAFT Okay, we've got the arm in the high level position over the PDP right now.

CAPCOM Roger.

SPACECRAFT Are you there, Sally?

CAPCOM That's affirm.

SPACECRAFT Just passed south of Afganistan and as we did so in passing over the middle east we were reminded that President STS-

Reagan dedicated our flight to the people of Afganistan. This week marks the 207th anniversary of Patrick Henry's famous "Give Me Liberty or Give Me Death" speech and we're proud that that spirit is alive today and not only in America but also in Afganistan.

CAPCOM Roger, Jack, I'm sure they appreciate that.

SPACECRAFT Sally, it seems to me this morning I read a message related to the way of operation of the PDRS DACs BCo can't find it off hand, maybe you could somewhoRH as what was said and if we need them for this operation I'll do it right.

CAPCOM Roger, Jack, I've got it right here. What we want you to do is run each DAC camera at 6 feet per second for 30 seconds and then if they operate normally at 6 feet per second run each at 24 feet per second for 15 seconds and I can continue if you want to if you've got a pencil or I can just read you the next step when you're ready.

SPACECRAFT Like right now, for example.

CAPCOM Roger. If the if the DACs work at 24 frames per second for 15 seconds we'd like you to use the cameras at 24 frames per second or 6 frames per second, however it's called out in the checklist and just not use any of the DACs that do not operate. And we'd like to hear the results of this test.

SPACECRAFT Okay, I'm going to run them at 6 frames per second for 15 seconds right now, right?

CAPCOM 6 frames per second for 30 seconds.

SPACECRAFT Okay. Okay, the only one that is showing a run light is mid aft and all the other breakers are still in but no lights are on.

CAPCOM Roger, standby.

END OF TAPE

SPACECRAFT The shaking and rattling sort of ride that Joe and Dick described was there, so I was surprised, I expected that to start with SRB ignition and I definitely remember the airplane start to shake and rattle and chatter at main engine ignition. With that and with a little confusion in my mind have the SRBs fired or not. But then when they fired, there was no doubt that that was when they fired and the whole vehicle was rattling before we were even off the pad. And then that shaking and rattling occurred all the way through first stage and then staging began a big completely enveloping flash that's been described before and then it was just smooth after that.

CAPCOM Okay real good Gordo. Thank you. One minute left here at Bermuda.

SPACECRAFT Yeah, I remember about the same thing the first stage ride was smoother than I expected it to be although it was rougher than the second stage ride. And I recall the orange flash enveloped the windscreen also at SRB SEP although the SRB SEP as I remember seemed very clean as did the AP SEP and reported there seemed to be no sound or lurch or anything like that when either ET SEP or SRB SEP occurred.

CAPCOM Rog. Copy all that and we've got some great pictures down here that you're going to love to see next week. We've got about 30 seconds left here at Bermuda. The entry team is coming on and their anxious to fly with you all day here. We'll be back talking to you tonight right around sleep time. Have a good day guys.

SPACECRAFT Thanks for hanging in there all night. Thanks to you and Tommy and the entire team and we'll look forward to working with you again.

END OF TAPE

PAO ...attach the knob in the proper position but it was determined that we'll be leaving that as it is as the valve is open and can be controlled by other means. At 2 days 22 hours and 4 minutes Mission Elapsed Time, this is Mission Control Houston.

PAO This is Mission Control Houston. The off going Ivory Team Flight Director Tommy Holloway is reported to be on his way to building 2 for the upcoming change of shift/news conference and should be arriving there momentarily for that press conference to begin.

CAPCOM Columbia, Houston through Madrid for 5 minutes.

SPACECRAFT Buenos dias.

CAPCOM Roger your loud and clear also and we'd like to know how you enjoyed breakfast and what you ate this morning.

SPACECRAFT Well I'm certainly eating a little better than I have been. I had granola with blueberries and I had grapefruit juice.

CAPCOM That sounds pretty good Gordo. How about Jack?

SPACECRAFT Well let's see. The old kid had warm cocoa, he had one vanilla instant breakfast and half a package of eggs, and one container of water.

CAPCOM We copy that Jack.

SPACECRAFT I ate a little bit before I went to bed last night too. I had some cereal. I think granola or something like that and I had one of those OPS containers of mushroom soup.

CAPCOM Hey great. Sounds like your appetite is coming back.

SPACECRAFT Sally, we activated the channel 2 tape recorder 1 for eurostats at 2206, the port light status was on.

CAPCOM Roger Jack and we've got a question from the EEVT Principal Investigator (PI). He'd like to know how well the EEVT ops went yesterday during runs 3, 4, and 5 and whether you have any comments on the migration in the columns.

SPACECRAFT They went very well. No fuss no muss all the temperatures were right on. We even took a few 16 mm of Gordo getting the operation started on the 5th one and as far as migration is concerned, we are looking at, except for the red blood cells they all look good, but between the time that we went from run 2 after 60 minutes to freeze and I noticed that every

time we'd take one after being frozen, that's what it looks like, looks like ice so I can't do anything about the migration.

CAPCOM Roger that's a good description and we'll get the camera photos post flight.

SPACECRAFT It is looking good. I haven't spilled a drop of fluid or had any problems or with nominal readings or anything. Except for that column temp that we reported .

CAPCOM I'm sure they appreciate that Gordo. And one more question from the ECOMs. They're interested in how the cabin temperature was last night.

SPACECRAFT It averaged comfortable. It was chilly downstairs, it was warm upstairs but not exceptionally so either place though.

SPACECRAFT I slept upstairs I started to sleep in the seat with my jacket off, and with my jacket on again it seemed like it was too warm up there so I moved back to the aft part of the flight deck and I tied myself with a string to the bulkhead and just kind of floated there all night and I was comfortable. I did notice that when I went down the stairs this morning that it seemed colder downstairs than up.

CAPCOM Okay Jack. Our theory down here is that that's because heat rises.

SPACECRAFT You thought you were going to get me on that one didn't you?

CAPCOM Roger. 30 seconds left. We'll talk to you at Indian Ocean at 2225.

SPACECRAFT To be frank about it, you almost did

SPACECRAFT There's a little hot air coming up on up the uplink.

CAPCOM I heard that.

END OF TAPE

CAPCOM Columbia Houston, back with you through Orroral for about 4 and 1/2 minutes.

SPACECRAFT Yea Dave.

CAPCOM Columbia Houston, at your convenience, stars 33 and 13 are in the table. You're go for an Inertial Measurement Unit (IMU) align and there's no requirement for an SM check point this morning.

SPACECRAFT Okay, no check point and stars 33 and 13 are good for alignment (garble). And hope you don't mind we got check point already.

CAPCOM No factor Jack, no problem at all. Columbia Houston about 40 seconds to Loss of Signal (LOS). The ivory team will be signing off on this pass. Enjoyed working with you last night, through the night, and this morning. Silver team will be taking over for us and the crystal team we haven't seen for a couple of days.

SPACECRAFT Okay. for maybe setting the sighting machine for us. Things are going along nice and smooth just like we'd like to see them.

CAPCOM Roger, Gordo, 12 seconds to go, we'll see you again tonight.

SPACECRAFT Roger, thanks to you and Donny and all the troups.

CAPCOM Thank you Jack.

PAO This is Shuttle Mission Control. We're in a loss of signal period. Having just come out of Orroral Valley. It's breakfast time onboard the Columbia and earliest scheduled crew activity is in (following breakfast) is in about 30 minutes when commander Jack Lousma is scheduled to activate the PDP and the plasma diagnostic package and pilot Gordon Fullerton is to initiate a supply water dump. Colonel Fullerton is to initiate the remote manipulator system activities by unstowing the RMS at mission elapsed time of 2 days and 23, 2 days 21 hours 23 minutes. And there will be some berthing and unberthing activities with the RMS prior to grappling and deployment of the plasma diagnostic package. Columbia on its 48th orbit of the earth. Mission elapsed time 2 days 21 hours 27 minutes. This is Shuttle Mission Control.

PAO Mission Control Houston. 2 days 21 hours 51 minutes mission elapsed time. Standing by for reacquisition of signal with Columbia as we began a stateside pass in just about 10 seconds.

CAPCOM Columbia Houston, the silver team's back with you. Looking forward to day 4.

SPACECRAFT Sally so are we.

CAPCOM Roger, Gordo.

SPACECRAFT You know these changes in the book before it's over, so we'll be set to go.

CAPCOM Sounds good and let us know if you got any questions. And Columbia I've got the numbers for your water dump this morning when you're ready.

SPACECRAFT Uh, hold on a minute.

CAPCOM Roger.

SPACECRAFT Okay, I'll take them.

CAPCOM Okay, we'd like you to dump tank bravo only to 10 percent, 1 0 percent.

SPACECRAFT Okay, tank bravo to 10.

CAPCOM Roger, and that's scheduled in the CAP at 2200. And Gordo, just a reminder, the OSS-1 tape recorder 2 is not operating so during the PDP activation this morning you should just disregard all references to OSS-1 tape recorder 2.

SPACECRAFT I was wondering about that, it's totally given up to the ghost huh?

CAPCOM I'm afraid so. Gordo, just to make sure you understand though that recorder is redundant to tape recorder number 1 so we are getting all of the OSS-1 data.

END OF TAPE

CAPCOM ...the shutters, of course the stars of opportunity is we could get them and the minus "z" tracker is looking at the Earth right now but when its clear you can go ahead and cycle it. The "y" is clear at this time.

SPACECRAFT Okay I noticed in looking at them that they are enabled and I will open the shutter on the Y tracker. And we have several stars on the table.

CAPCOM Roger.

SPACECRAFT Looks like you guys are really doing a lot planning alright, Dale.

CAPCOM Okay we're not sure whether that came down tongue in cheek or what there.

SPACECRAFT Say again.

CAPCOM We understand your comment Jack.

SPACECRAFT Oh, I'm working the changes in my CAP right now. I was just saying it looks like you guys have really done a lot of planning a lot of hard work.

CAPCOM Okay we appreciate the comment. It looks like it's going to be a busy day but it ought to be a good one and enjoyable for you and us both.

CAPCOM Columbia, Houston. 15 seconds to LOS. Yarragadee is next at 2107.

SPACECRAFT Okay we'll see you at Yarragadee.

PAO Shuttle Mission Control. The caution and warning alarm which was tripped on the Columbia turned out to relate to temperatures on the RMS and CAPCOM David Griggs advised the crew that they had uplinked a new TMBU, Table Maintenance Buffer Update, broadening the parameters the temperature parameters for that reading and precluding the chance that that alarm will trip again. We're in a loss of signal period for about 30 minutes until we reacquire again on orbit 47 and when we do reacquire it will be through the Yarragadee station in Australia. Columbia is right now over the Mediterranean Sea just over the tip of Southern Italy at Mission Elapsed Time 2 days 20 hours and 42 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston with you through Yarragadee for about 8 minutes.

SPACECRAFT (garbled)

SPACECRAFT It's loud and clear Dave, how me?

CAPCOM Rog. I've got you loud and clear Gordo.

SPACECRAFT We're just reading the morning paper. I have Sunday's breakfast and shaved and washed up and definitely feeling ready to go do it.

CAPCOM Okay sounds good. A little more explanation on the PDRS temps. We are looking at the data and found out that we were at a bad spot on the cal curve. We were getting some bit cycling. We did finish the RMS thermal cold testing and our intentions are now to leave the heaters in the auto mode for the remainder of the flight and we've also, as I told you before, changed the TMBUs to a lower level and you should not receive any more PDRS temp C&Ws unless there really is an anomally.

SPACECRAFT Okay and all these call outs that say heaters on and off you want to just leave them auto from here on out, is that what you did?

CAPCOM That's affirmative Gordo. Just leave the heaters auto.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. About 45 seconds to LOS here at Yarragadee. Orroral is about a minute and a half from now. You're earliest Master Events Timer (MET) of enable will be 2200 and the forward light status should be lit. One other thing relative to the recorder, we would like track select 9 on tape recorder 1.

SPACECRAFT Okay. Dave we copied that.

CAPCOM Okay we'll talk to you again at Orroral in about 1 minute.

CAPCOM Columbia, Houston back with you through Orroral for about 4 1/2 minutes.

SPACECRAFT Okay Dave.

END OF TAPE

Music ("Air Force Fight Song", Wake up)

SPACECRAFT That's very good, that'll get us off to a running start (garble), thank you.

CAPCOM Okay, Gordo, we had a few people standing up around here too.

SPACECRAFT I even (garble) stood up for that myself Dave. Don't spread the word around though.

CAPCOM Okay, Jack, we copy that, couple of minutes to go and then we'll pick you up at Madrid at oh, 34 minutes after. And we don't have anything to pass to you this morning. So it's almost your free time for a good meal.

SPACECRAFT You guys are easy today. Compliments to your Table Maintenance Buffer Update (TIMBU) makers, they sure haven't been up yet, we get to have an alert, I believe, during the night.

CAPCOM We copy that. I understand no alerts during the night. Columbia Houston, we didn't want to pass up that opporutnity, the Payload Data & Retrieval System (PDRS) alerts, you can disregard.

SPACECRAFT Okay, what can we do to keep it from happening to us all the time? We get repeated mass and tones.

CAPCOM Standby Jack, we'll get an answer for you. Columbia Houston, we're working on that down here, it was a mistake in our TIMBUs and we should have it corrected here shortly.

SPACECRAFT Okay.

CAPCOM Columbia Houston, approaching (Loss of Signal) LOS, we'll see you at Madrid in about 6.

SPACECRAFT Okay.

PAO This is Shuttle mission control, we've had loss of signal through Bermuda. Obviously the air force hymm waking up the crew this morning and yesterday morning the song was the marine hymm. Columbia pilot Gordon Fullerton congratulated the team on its efficiency and setting up TIMBU's. TIMBU's are the acronym for table maintenance buffer update, which is the process of setting parameters above or below which readings would trigger an alarm. The fact that no alarms went off and woke the crew during the night was the subject of that congratulations from Gordon Fullerton and as much as the crew was not awakened during the night. However, with some irony no sooner did Colonel Fullerton say that than an alarm sounded onboard the Columbia

through some inadvertent measurement and the flight control team is now looking at the episode which caused that alarm. And they suggested mitigating action when we reacquire ground contact in four and a half minutes through Madrid. Mission elapsed time, 2 days, 20 hours, 30 minutes, this is Shuttle mission control.

CAPCOM Columbia Houston back with you through Madrid for about 6 minutes.

SPACECRAFT Okay, we got you at Madrid.

CAPCOM Columbia Houston we sent up a new TIMBU for the PDRS temps you were getting. We'll take the hits on that, it was our fault. We had reset the TIMBUs for the limits for daytime OPS, and I guess we just sent a little bit to early. So, don't anticipate anymore caution & warning (C&W) on that. We'd also like you to cycle the star tracker shutters for some stars of opportunity if we could get them. And the minus Z tracker is looking at the Earth right now.

END OF TAPE

PAO This is Shuttle Mission Control. Mission elasped time is 2 days 19 hours and 44 minutes. Columbia is just now passing over the Orroral Grand, Orroral Valley station in Australia on rev number 46. Fifteen minutes remaining in the crews sleep period, however the electrical power instrumentation and lighting systems engineer has reported to the flight director that his data indicates that the crew is awake. That there is some activity in the cathode ray tubes onboard Columbia. And although the official sleep period is still in force accordingly to then the, there won't be any initiative by the flight control team to engage the crew in dialog until the sleep period has expired. Nevertheless business seems to be underwa onboard Columbiam as the crew prepares for flight day number four. Mission elasped time is 2 days 19 hours 45 minutes. This is Shuttle Mission Control.

PAO We have had loss of signal in Orroral Grande, we will reacquire again through the Bermuda ground station in approximately thirty minutes and we can anticipate our first voice contact with the crew of the day. The first voice contact of the day in about 30 minutes as we approach the ground station at Bermuda. Mission elasped time 2 days 19 hours 48 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control, mission elasped time is 2 days 20 hours 20 minutes. Columbia is on its 47th orbit of the Earth. And we're about one minute away from acquisition of signal through the Bermuda ground station. And in as much as we saw some activity onboard the Columbia through the electrical consumption monitoring. Some activity onboard Columbia was apparent through the Orroral Valley station. We can safely expect, anticipate voice contact during this pass. Over Bermuda, there is some key hole in this pass, we will have 40 seconds of opportunity for voice contact then a loss of signal through the keyhole for about a minute. Then reacquisition of signal for another five and a half minutes. Flight control team is poised to begin the days business. Capsule communicator David Griggs should be sending out the wakeup call shortly. Mission elasped time 2 days 20 hours 22 minutes. This is Shuttle Mission Control.

CAPCOM Goodmorning Columbia. With you through Bermuda. How are you feeling this morning?

SPACECRAFT Goodmorning Dave, happy morning to you, we're up and at'em and taking care of our checklist changes and making a little breakfast, shaving and so forth, looks like a great day out there and we're feeling a little better.

CAPCOM Sounds good Jack, we've got a keyhole coming up here in a few seconds, we'll have some music for the Junior

Service when we come out of it.

SPACECRAFT We'll be listening. Do I have to stand up for this?

PAO We're in that keyhole period now and acquisition of signal again very briefly, in a moment or two.

Musical Interlude.....

END OF TAPE

PAO This is Shuttle Mission Control, we've just had a pass over the Madrid tracking station, Flight Director Tommy Holloway is (garble) each of the Flight Controllers on his team and has been assured that each received good data and that systems onboard Columbia continue to function nominally. Two and a half hours remaining in the crew's sleep period. Columbia is on its 45th orbit of the Earth, just over the Mediterranean Sea presently, mission elapsed time is 2 days, 17 hours, 34 minutes, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, we're in the middle of very long loss of signal period, a total of about an hour and a half without contact with the Space Shuttle Columbia. About 30 minutes remaining in that loss of signal period. And about an hour and a half remaining in the astronauts sleep period. Columbia is now in its 46th orbit of the Earth. In daylight approaching the terminator in the darkness just off the coast of South America. Mission elapsed time is 2 days, 18 hours, 38 minutes, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, Columbia is passing over the ground station in Madrid right now, giving the Flight Controllers their first look at data for about an hour and a half. Flight Director Tommy Holloway has asked each of his team members to scrutinize their data and give him the status reports. There's about, just slightly less than one hour left in the crew's sleep period. Columbia is on its 46th orbit of the Earth. The status reports are beginning to come in now to the Flight Director Tommy Holloway and with uninimity the Flight Controllers are reporting nominal status of all systems onboard Columbia. Mission elapsed time is 2 days, 19 hours and 3 minutes, this is Shuttle Mission Control.

END OF TAPE

PAO ...about a total of 12.7 kilowatts and we have just approximately 6 hours remaining in the sleep period for Astronauts Lousma and Fullerton. We'll have acquisition of signal again in about 8-1/2 minutes at Ascension Island and the downlink data will continue to provide the Mission Control Center with information on system status. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Mission elapsed time, 2 days, 15 hours, 8 minutes. The flight control team here in the Mission Control Center remains active and busy while the astronauts are asleep. Flight Director Tommy Holloway and his team are busy planning tomorrow's schedule with crew activities, examining anomalies, and discussing potential solutions, and of course, continuing monitoring onboard systems during ground station passes to assure that Columbia remains healthy. Meanwhile, Ast onauts Jack Lousma and Gordon Fullerton are having an apparently restful night undisturbed by alarms or caution warning signals. Just slightly less than 5 hours remaining in the sleep period. This is Shuttle Mission Control.

CAPCOM (garble) Gordo and we'd like to know if you did anything to warm up the cabin.

SPACECRAFT We didn't do anything to warm up the cabin. I didn't want to put the air water loop on it because I was afraid I'd wake up Gordo whenever I turned the Cathode Ray Tube (CRT) down we get a 10 minute tone.

CAPCOM Roger. We copy.

SPACECRAFT However, we have left the cabin heat exchanger pinned to full hot and, as I recall, the inner heater flow was max. Much less as it left, can you confirm that?

CAPCOM Roger Jack. We'll look into it. And we can confirm that Jack.

SPACECRAFT Okay. So looks like the only thing left is either to leave up the window shades and that makes it kind of hard to sleep, or get the water loop up. But maybe this nose sun will make a warmer cabin. We'll see.

CAPCOM Roger Jack. Let's hope so.

PAO This is Shuttle Mission Control. The voices heard a few moments ago were from a VTR playback and was not a live air to ground transmission. It was from a playback of some video tape that was recorded earlier that was inadvertently sent through the audio circuit on the air to ground network and again that was not a live audio exchange. The crew is still asleep and has about 4 hours remaining in its sleep period. Mission elapsed

time is 2 days, 16 hours, 2 minutes. This is Shuttle Mission Control.

END OF TAPE

PAO ...eight hour sleep period tonight and the crew was instructed to begin tomorrow's activities with the crew activity plan for flight day 3 on page 4-34 in the CAP and looking forward to unberthing the plasma diagnostic package early in the work day tomorrow. Mission elapsed time is presently 2 days, 11 hours, 27 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. We have had loss of signal through the Hawaii tracking station with that pass completed without voice communication with the crew and we have now entered their sleep period. Data acquisition during that pass was analyzed by the flight control team. Flight Director Tommy Holloway went around the room and got assurances from each of the console positions that the data indicated a healty spacecraft. And we are going to be in a loss of signal period for about 20 minutes before we pick up the ground track again at Santiago (Chile) and, of course, there will be no voice contact barring anomalies during this period. The Columbia will continue to downlink telemeter data to those ground stations which will be relayed to the Control Center here, so throughout the night, the Flight Control Team will be monitoring the health and well being of space shuttle systems onboard. Mission elapsed time is 2 days, 12 hours, and 2 minutes. Astronauts Lousma and Fullerton now in their sleep period after having completed their third day in space making STS-3 presently the longest duration of any of the three space flights of the space shuttle Columbia. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Astronauts Jack Lousma and Gordon Fullerton are spending their third night in space. They entered their sleep period at about 10:00 p.m. Central Standard Time after having spent a comfortable and productive day on orbit. Columbia is now in its 42nd orbit of the Earth and we are about 50 minutes away from acquiring signal again in a rather long loss of signal period. Of course, the flight control team continues to monitor telemetry as the vehicle passes over the ground stations and the crew's expected to be rested and refreshed in the morning and ready to tackle what is certain to be a full and ambitious day of crew activities. Mission elapsed time is 2 days, 13 hours, and 6 minutes. This is Shuttle Mission Control.

PAO Shuttle Mission Control. Mission elapsed time is 2 days, 14 hours even. Just completing the pass over the Santiago (Chile) station and Flight Director Tommy Holloway has polled all positions to afirm that downlink data indicates that a good solid vehicle and has received assurances that that is the case. Vehicle still in a nose to sun configuration and data indicates that the tail end of the vehicle continues to show decreasing temperatures, getting colder and colder but well within the constraints that were expected. Cabin temperature onboard Columbia is 81 degrees. Cabin pressure is 14.7 psi. Fuel cells

are putting out a total of 12.7 kilowatts, and we have just approximately 6 hours remaining in the sleep period for Astronauts Lousma and Fullerton. We'll have acquisition of signal again in about 8-1/2 minutes at Ascension Island and the downlink data will continue to provide the Mission Control Center with information on system status. This is Shuttle Mission Control.

END OF TAPE

CAPCOM We'll be looking at them then. Relative to the circuit breaker that's popped. We'd like to look at it when we have data, and it looks like the best time would be at IOS which is coming up in a couple of MsJetes after we finish this pass.

SPACECRAFT Alright.

CAPCOM Columbia Houston, we're 15 seconds to LOS, IOS AOS in 2 we'll see you there.

CAPCOM Columbia Houston, with you through Indian for about 6 minutes and we're ready on that circuit breaker if you'd like to reset it.

SPACECRAFT Okay, which one is it Dave?

CAPCOM It's the one that was popped Jack let me get the correct nomenclature for you, standby.

SPACECRAFT (garble) back aft main B (garble)

CAPCOM That correct Jack, DAC aft main B circuit breaker, it's the one that was popped.

SPACECRAFT Want me to reset it?

CAPCOM Rog. We're looking, go ahead and reset.

SPACECRAFT Rog. It's reset.

CAPCOM Roger. Columbia Houston with about 1 minute to go here at IOS, give you a synopsis of todays activities and tomorrows plans if you're ready.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, all data today looks good, everybody's very happy with it. Tomorrow's plans are to pick up flight day 3 scheduled activities pretty much as published in the CAP. And will start on page 4-34 which is the first day of flight day 3, we'll do some PDP un-berthed operations as scheduled. You're consumables all look good, no problems there. And we're all set down here for your sleep period. As a reminder, the N2 still needs to be closed, that's system 2 and as far as we're concerned we don't have anything more so we're going to be in the listen mode at Hawaii.

SPACECRAFT Okay, fine enough Dave, we'll try to get a good night's rest tonight and I'll take care of the Nitrogen drop.

CAPCOM Rog. see you in the morning, about 6 seconds to LOS, have a good evening.

SPACECRAFT Roger. What time do we wake up tomorrow.

CAPCOM Standby. Columbia Houston, wakeup will be 8 hours from sleep.

SPACECRAFT Okay.

PAO Shuttle mission control, mission elapsed time 2 days 11 hours, 25 minutes, we've had loss of signal through Indian Ocean station. We will reacquire again in about 30 minutes over Hawaii. There are 34 minutes remaining before the sleep period begins. However, capcom David Griggs advised the crew that mission control does not plan to initiate any communication with the crew over Hawaii. Although the crew does have the option to of course do that and there technically about 4 minutes of communication time available before the sleep period regimen begins and the crew are at this point would be involved in some pre sleep activity which in part involves closing down the gaseous Nitrogen system number 2 as the flight control team advised. And configuring cabin lighting and cathode ray tube displays. Putting up window shades over the flight deck windows and configuring alarms and timers on the flight deck. Temperature in the flight deck is still comparatively warm, 81 degrees, and steady which is again warmer than it had been previously and again is reflection of the nose to sun attitude that the vehicle is in which will remain to be that attitude throughout the sleep period. Humidity in the flight deck is 41 percent and steady. 8 hours sleep period tonight then the crew is instructed to begin tomorrow's activities with the crew activity plan for flight day 3 on

END OF TAPE

PAO This is Shuttle Mission Control. We are in a 16 minute loss of signal gap here between Santiago and Botswana. During that pass, Columbia Pilot Gordon Fullerton reported that they had a very nominal experience stowing the remote manipulator system. In Fullerton's words, "it went perfectly by the books just like in the simulator". Also reported that 5 of the 8 required samples for the electrophoresis experiment have now been acquired. The crew was instructed to close the gaseous nitrogen system number 2, part of the cabin pressurization system, and Jack Lousma was advised to operate the cathode ray tube displays this evening by turning the illumination on the tubes up and down rather to turn them on and off which, or to turn on, from on to standby, which produces an alarm system onboard and the crew (garble) the flight control team's advice is to use the illumination knob to bring up and down the visibility of the data on the CRT rather than to change the tubes configuration. We will enter the sleep period in just slightly more than an hour. Columbia presently on its 41st orbit of the Earth. Mission elapsed time is 2 days, 10 hours, 55 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control. Mission elapsed time 2 days, 11 hours, 9-1/2 minutes. We're about 50 minutes from entering the sleep period and we'll have voice acquisition at Botswana in just a matter of seconds now for a duration of about 5 minutes.

CAPCOM Columbia Houston with you through Botswana for about 6 minutes.

SPACECRAFT Okay. On the earlier message this morning, it said for presleep to look at the PDRF data at acquisition camera circuit breakers and close them. At one point the aft main B breaker popped. That was yesterday. We never tried to reset it. You never asked us to, so it's still out. Do you want me to reset that?

CAPCOM Standby Gordo. We were talking about that a little earlier. I'll have an answer for you shortly.

SPACECRAFT Okay.

CAPCOM Columbia Houston. While we're sorting that one out, we've got a good state vector onboard. Carry you through Northrup. First opportunity, which would be number 49.

SPACECRAFT Roger.

CAPCOM We've got a couple more passes this evening before we sign off. We'd like to get the PGU readings on one of those passes if you don't have them yet Gordo. And also, did you have any questions on the TPR message number 22?

SPACECRAFT No, I don't have any questions about it Dave. I just looked at the teleprinter and I just received a message.

CAPCOM Okay. We copy. Thank you.

SPACECRAFT Are you ready to copy the PGU numbers?

CAPCOM Roger. Go ahead Gordo.

SPACECRAFT At MET of 2 days, 10 hours, our light was on, temperatures were 26.2, 26.2, 26.0, 26.0, 26.5, 27.4. Temp warning light was off. The lamp status was on. Record fault light off. Over.

CAPCOM Roger. Columbia, we copy all that.

SPACECRAFT I understand the OPS recorders are not on right now but they will be again in the morning. Is that right?

CAPCOM That's correct Jack. They'll be on again in the morning and we'll be looking at them then. Relative to the circuit breaker that's popped. We'd like to look at it when we have data and it looks like the best time would be at IOS which is coming up in a couple of minutes after we finish this pass.

END OF TAPE

here at Johnson,

CAPCOM Let me check what it's looking like at the other places here for you.

SPACECRAFT We happened to be above at the highest tops up here, occasasional below, but no turbulence

CAPCOM Okay we understand that PIREP and weather generally looks pretty good at all sites.

SPACECRAFT Okay.

CAPCOM And Columbia Houston, Gordo, let me test your memory here if I could, when you did the TV session showing the particulate animation for the aft part of the vehilce we'd like to know if you had any of the payload bay lights on at that time.

SPACECRAFT Oh golly, I don't think so, at least if they were, they weren't significant because of the level of the illumination.

CAPCOM Okay, just a curious question, the PI was interested, thank you.

SPACECRAFT Okay. I haven't said much about the RMS operation. My compliments to the Canadians, everything that is done is just like the simulator or better. Very smooth, absolutely no suprises. Really looks like a fine piece of machinery.

CAPCOM Gordo, we're all very happy to hear that, thank you.

SPACECRAFT And Jack, we the EEVT, we've done five out of the 8 samples now, and hasn't leaked a drop with all the numbers, with one exception we talked about earlier for temperatures and currents or voltages or whatever and tape recorders and cameras working, I hope we got some good data for them.

CAPCOM Sounds good Gordo, sounds like you're enjoying the days OPS up there. Let me pass something to you for the night time configuration if I could.

SPACECRAFT Okay.

CAPCOM Okay, I think you were briefed earlier today about the N-2 systems thermal responses. We're still not concerned about it, but we would like to do is prior to sleep tonight. We'd like to take N-2 system 2 supply to off and just run on system 1 this evening.

SPACECRAFT Right now?

CAPCOM No, let's do it just before sleep or at sometime at your convenience. There's no rush on it.

SPACECRAFT (garble) systems supplied number 1

CAPCOM We'd like N-2 system 2 off.

SPACECRAFT Okay, into system's 2 supply will go off.

CAPCOM Rog. And in the last minute and 30 I got here before LOS, on the CRT configuration for the evening, Jack, what you can do is configure 1 to standby, and if required in the evening it will be available for you when you turn it on, then if desired you can turn the illumination down and by using this procedure you avoid any alarms.

SPACECRAFT Well, we've been doing that and when I go form standby to on, of course and nothing happens but then when I go back to standby, it gives me a I/O error CRT.

CAPCOM Okay, Jack the problem there is when you go back to standby you get the alarm. What we suggest is that once you turn it on go ahead and just leave it on but turn the brightness control down on it so it doesn't bother you. And we're not concerned at all about consumables here so you can leave any equipment on that you desire for the evening to help keep cabin warm if you require it.

SPACECRAFT Okay I understand, I guess that's what I did last night after I brought it up. I had some strange tones last night by the way. I don't know if you analyzed your UHF data or not but (garble) over ir-ground one or UHF, the only way I could them off was, ICOM. There was a strange buzzing sound that lasted about a second every 15 seconds for a short period of time.

CAPCOM Okay, Jack we're a couple of seconds to LOS, we'll pick up the conversation next time at Botswana.

SPACECRAFT Alright.

PAO This is shuttle mission control, we are in a 16 minute loss of signal

END OF TAPE

CAPCOM Okay before you disable this evening we would like you to check the track two open, and either record or voice to us the monitor level, and following that, then we would like to have track one selected to eight. And voice or record the monitor level there.

SPACECRAFT Let's see. You want tape recorder two to open and number one to eight.

CAPCOM That's correct.

SPACECRAFT Okay I see on a level of three.

CAPCOM I understand a level of three on track two.

SPACECRAFT Don't get confused between TR which means tape recorder and track.

CAPCOM Okay I copy.

SPACECRAFT We are now reading spec 8 on tape recorder one.

CAPCOM Roger. Columbia Houston, Gordo we understand that tape recorder one, track select 8 has a monitor level of three. We would also like to get tape recorder two track select open and check that monitor level.

SPACECRAFT Okay you have to specify both rotaries I think there is only one monitor level. I have right now on the tape recorder one tape select at 8, number two at opens and the monitor level at three.

CAPCOM Roger Gordo, payload says he's got the data he needs thank you. Columbia Houston, Gordo, the RMS data down here looks like its getting a little cold, could probably anticipate the C and W here shortly. We would like you to go to auto on the heater and as per the CAPCOM timeline you can berth on schedule. And correction Columbia you can go ahead and cradle now if you would like.

SPACECRAFT Okay you want the heaters out now and then go ahead and cradle, is that correct.

CAPCOM That's correct, Gordo.

SPACECRAFT Okay the heaters auto, and I'm going ahead and stow it.

CAPCOM Roger and we see it in auto. And Columbia Houston we're looking at about 10 seconds to LOS now. We'll pick you up again at Santiago in about 20 minutes.

SPACECRAFT Okay we'll see you in about 20, Dave.

CAPCOM We will be waiting, see you now.

PAO We had a loss of signal through Hawaii. The astronaut, David Griggs, serving as capsule communicator now. During that pass the crew was advised that they might expect their C and W caution and warning alarm due to cold temperatures on the remote manipulator system which is of course an artifact of the vehicle being in a nose to sun configuration and the resultant in cooling occuring on that portion of the vehicle. Also again because of the nose to sun configuration the temperature in the flight deck is becoming rather toasty, up around 82 degrees presently which is substantially warmer than it was this time yesterday when the vehicle was in the tail-sun configuration. We will reacquire signal again in approximately 19 minutes through Santiago, Chile for a pass of 5 and a half minute duration. Mission elasped time is now 2 days 10 hours 29 minutes, this is shuttle mission control.

CAPCOM Columbia Houston through Santiago for about 6 minutes.

SPACECRAFT Okay Dave we got the round curve. (garble) arm is put to rest stowed and locked up for the night.

CAPCOM Okay Gordo that sounds good and I apologize for my misunderstanding on the OSS-1 recorder, I had my head screwed on straight since I last talked to you.

SPACECRAFT That's not a very straight forward system.

CAPCOM Like many others I'm sure.

SPACECRAFT How's the weather down there today?

CAPCOM Weather's nice, here at Johnson. Let me check what its looking like at the other places here for you.

SPACECRAFT We happen to be about at the highest top up here....

END OF TAPE

at the Indian Ocean Station now. Next acquisition through Hawaii in 29 minutes. Shift handover will take place here in the control center shortly with Flight Director Neal Hutchinson and the Silver Team of flight controllers handing over to Flight Director Tom Holloway and the Ivory Team. The change of shift news conference is estimated for 8:30 p.m. Central Standard Time in room 135 of the JSC News Center, 8:30 p.m. Central Standard Time in the JSC News Center. At 2 days, 9 hours, 52 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Mission Control. Mission elapsed time is 2 days, 10 hours, 17 minutes. We'll have acquisition of signal in about 3-1/2 minutes through Hawaii. Flight Director Tommy Holloway and his flight team have completed the handover and assumed responsibility for the conduct of the mission. (garble) are preparing to leave the MOCR now and is on his way to building 2 in preparation for the change of shift briefing which shall occur on time at 8:30 p.m. Central Standard Time. We'll have voice contact in about 3 minutes with Columbia at 2 days, 10 hours, 18 minutes. This is Shuttle Mission Control.

CAPCOM Good evening Columbia. The Ivory Team is back with you. How're you doing tonight?

SPACECRAFT Boy, you guys work day and night don't you Dave?

CAPCOM Well, we really enjoy it Jack.

SPACECRAFT Well, we're just sitting here spinning nose to sun. We got quite a lot done today I think. I initiated a fuel cell purge at 9:51. You might want to take a look at that. We're looking at a little attitude maneuver on the hour and the IMU's were just aligned with some stars of opportunity. Gordo is getting ready to work the arm after awhile and we're going to power down that PDP but I need a latest MET of disable for the PDP.

CAPCOM Roger Jack. Latest MET of disable is 11 hours, 30 minutes, and as long as we're on that subject, if you've got a minute we like to do a little troubleshooting on that system.

SPACECRAFT Okay Dave. I'm over at the L-panels here. Go ahead.

CAPCOM Okay. Before you disable this evening, we'd like you to check track 2 open and either record or voice to us the monitor level and following that then we'd like to have track 1 selected to 8 and voice or record the monitor level there.

END OF TAPE

PAO (garble) the flight to forego the backup cradle for today, so when we come to the RMS, the PDP berth there, you can go ahead and power down the RMS.

SPACECRAFT Okay. I'll start right now

CAPCOM Columbia Houston. Gordo, we'd like you to wait on the powerdown until we get to the time in the CAP.

SPACECRAFT Okay. I got you. Wait till it's time.

CAPCOM Roger, and that's because we're still in the middle of the thermal test.

SPACECRAFT Okay.

CAPCOM And Columbia, Gordo, if you could comment on the water on the windows during the afternoon and any steps you took to work around that.

SPACECRAFT Oh we have pretty consistent 9 by 6 oval of condensation. In fact, we had it just then. I don't know we may have messed up some of the pictures. The window was clear when we started but there is some fog on now. That's the one we took the pictures through, but it was clear when we began.

CAPCOM Okay. We copy.

SPACECRAFT (garble)

CAPCOM Okay.

SPACECRAFT We haven's picked up any junk yet.

CAPCOM Roger. I copy you haven't picked any info on it and we're 30 seconds to LOS. Hawaii is next at 10 plus 21 and this will be the last pass for the Silver Team. We've enjoyed it today and the Ivory Team will be on next.

SPACECRAFT Okay. Well thanks for sticking with us. We've enjoyed it too and when the Ivory Team comes aboard, we'll be winding her down.

CAPCOM Roger, and we look foward to working with you tomorrow.

SPACECRAFT Thank you George and to Neal and all the rest of the gang. Thank you all.

CAPCOM Roger.

PAO This is Shuttle Control. Columbia is out of range

PAO This is shuttle control at 2 days 9 hours, 34 minutes, mission elapsed time. Botswana will have acquisition of Columbia in about 20 seconds, we'll standby.

CAPCOM Columbia Houston, through Botswana for 6 and a half minutes.

SPACECRAFT Okay, we're still hard at it here.

CAPCOM Roger that.

SPACECRAFT Thank you, we're in the 52nd exposure for column ten. Looks like you can see a little hint of the sun, squirting up out of F peg, it's only visible for about a foot or two on TV and not at all to the naked eye.

CAPCOM Okay, Gordo we copy.

SPACECRAFT Right now it seems to be going straight up.

CAPCOM Roger, Gordo the vcap folks are interested in the color if you could use camera delta for the rest of the observation.

SPACECRAFT Okay, I've been doing the advertised one for numbers 11, 12 and 13, you want the D camera right?

CAPCOM That affirmative.

SPACECRAFT Okay.

CAPCOM Columbia Houston, one minute LOS, IOS is next at 9 plus 43.

SPACECRAFT Okay.

PAO This is shuttle control, Bottswana has loss of signal, next station is the Indian Ocean station in a minute and a half. Crew still doing the electron beam search. Columbia is 2 minutes 10 seconds away from its sunrise on this orbit. We'll standby at 2 days 9 hours 42 minutes, mission elapsed time for acquisition through the Indian Ocean station.

CAPCOM Columbia Houston, through Indian Ocean for 7 minutes.

SPACECRAFT Okay, we just got down to the last column, number 13 as a hint of sunrise there to lighten things up.

CAPCOM Roger, Gordo we copy and that's good work. And Columbia, Jack I've got some numbers to read out to give you a roll angles for sleep tonight, if you're ready to copy?

SPACECRAFT Go ahead, George.

CAPCOM Roger, Jack, and this is a tweak of your attitude for the night. It puts us about 5 degrees ahead in roll with the small mismatch that we've got, it'll bring us through even in the middle of the night and leave us about 5 degrees behind it in the morning, so we won't need another tweak. And the angles are roll 261.0, pitch 4.2, yaw 1.8, and we'd like to start the rotation at 1100 hours.

SPACECRAFT Okay, I copy, thank you George. How are the eye viewing of the, are they going to be all right.

CAPCOM They look real good Jack, they'll go for the night.

SPACECRAFT Do I have to make the IMU alignment or are we going to keep the IMUs where they are?

CAPCOM And Columbia Houston, Jack we've got two stars in the table and you're go to torque the IMUs.

SPACECRAFT Okay, thanks.

CAPCOM And those are stars 36 and 12 Jack.

SPACECRAFT Okay, I'll terminate idle and set up the star trackers then.

CAPCOM Roger. Columbia Houston, is Gordo on the logs there?

SPACECRAFT Go ahead.

CAPCOM Roger Gordo, we've decided since we've got plenty of opportunities coming up in the flight to forgo the backup cradle for today, so in, when we come to the RMS, the PDP berth there, you can go ahead and powerdown the RMS.

END OF TAPE

CAPCOM Columbia Houston through Hawaii for about two and one half minutes, over.

SPACECRAFT Hello there George. We thought we'd be hearing from you, how are you doing?

CAPCOM Real good Jack and you're loud and clear and Jack we sent a teleprinter message up about two hours ago and we'd like you to take a look at that for us.

SPACECRAFT Okay I'll do that.

CAPCOM And you can do that LOS. One other thing is we're going to stop recording voice after this Santiago pass that's coming up.

SPACECRAFT Okay. I did the cold case (garble) and the next thing looks like is terminate the cyro tank thermal test.

CAPCOM Roger Jack.

SPACECRAFT And we'd just assume go ahead and do the vcap initial OPS there if you give us the go for it and we do have time and we don't want to miss it.

CAPCOM Roger Jack that was scheduled to go along with the water dump you were doing and right now we'd just as soon have you make yourself a meal and have a good meal so we can get to bed on time tonight. We got a full day planned for tommorrow.

SPACECRAFT How about the water dump though? You want us to make it anyway or what?

CAPCOM Roger Jack. You're go to go ahead and do the water dump and realy you're call on vcap coming up over night pass here. If you think you can do it, you have the go.

SPACECRAFT Okay that was dump tank B to 30 percent, right?

CAPCOM That's affirmative. And standby. And Columbia Houston were one minute LOS. Santiago is next at 9 plus 16.

SPACECRAFT Okay. You did tell me 30 percent of the waterdump?

CAPCOM That's affirmative 30 percent.

SPACECRAFT Okay thank you George.

CAPCOM Roger, and We will see you at Santiago.

PAO This is Shuttle Control. Hawaii has loss of

signal. The next station to see Columbia will be Santiago, Chile in 24 and a half minutes. The crew was given a go on this pass to conduct the V-cap beam search. During the next night period at their option, Columbia will see the night side of this orbit in eighteen minutes. Beginning prior to the Santiago pass. At 2 days 8 hours 51 minutes, mission elasped time, this is Shuttle Mission Control Houston.

PAO This is Shuttle Control. Columbia is approaching acquisition through Santiago at 2 days 9 hours 15 minutes mission elasped time.

CAPCOM Columbia Houston we have you through Santiago for two minutes.

SPACECRAFT Okay, load and clear. We have initiated the water dump.

CAPCOM Roger copy and are you doing the V-cap beam search?

CAPCOM And Columbia Houston are you in the process of the V-cap beam search?

SPACECRAFT That's affirmative George.

CAPCOM Roger and no messages. Columbia Houston LOS in 30 seconds and a reminder we're going to stop recording ICOM voice after this pass and Botswana is next at 9 plus 35.

SPACECRAFT Okay.

PAO This is Shuttle Control. Santiago has loss of signal. Botswana is the next station in seventeen minutes. The crew is in the process of doing the V-cap beam search at this time. Another 26 minutes of night left in this orbit. At 2 days 9 hours 18 minutes mission elasped time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 9 hours 34 minutes mission elasped time. Botswana will have acquisition of .....

END OF TAPE

PAO This is shuttle control at 2 days 8 hours 1 minute mission elapsed time. Columbia is coming up on acquisition at Botswana for a 4 minute pass.

CAPCOM Columbia Houston through Botswana for 4 minutes with no messages while your looking for the beam.

SPACECRAFT Ok, well I got news for you, you might as well give us some messages cause the time we secured the last operation it was too late to get into the V cap business. However we'd like to do it on the next right pass.

CAPCOM Ok, we copy that Jack. Columbia Houston, Jack we've got 2 more beam searches coming up in the flight plan. We're going to pass this one and get the meal on the next flight pass. And Columbia Houston, for Gordo, we're thinking about trying to pick up the backup cradle test when we stow the RMS, if that's agreeable with you.

SPACECRAFT Tonight? Yeah, that should be okay.

CAPCOM Ok, that sounds good.

SPACECRAFT We just had 2 S76 comm messages, unexplained, no good reason on S76.

CAPCOM Roger, we copy that. Columbia Houston, Gordo that might be associated with the VTR if you're using that right now.

SPACECRAFT I am.

CAPCOM Roger, Godo, then it's the same thing we saw yesterday, and you can disregard.

SPACECRAFT Okay. How'd that TV pass come out down there George.

CAPCOM Came out just great Jack.

SPACECRAFT Was the lighting okay.

CAPCOM Just great. And Jack, while we've got a chance for the talk here, the clean up on the GAS, from what we heard on the last pass, if you'll just go to page 4-42 in the CAP, go through the procedure that's on that page without waiting the ten minutes between the cycles. That should clean things up for us for tomorrow. Over.

SPACECRAFT Okay, I'll do the procedure on 4-42, thank you.

CAPCOM Roger, a reminder, you do not have to wait ten minutes on that one.

SPACECRAFT I'm going to turn it over to Jack to kind of describe just which bugs are flying and what he sees as he stands real close.

CAPCOM Roger, and we're standing by.

SPACECRAFT Okay, again, Houston.

CAPCOM We're standing by for the CDR.

SPACECRAFT Okay, hello there space fans, here we are in the good ship Columbia. Speeding over the United States at 150 miles. Flying pretty fast, about 5 miles per second but there are some among us who are actually flying faster than we are. And in this box, they're not only flying along with us, but they are flying themselves. So they're actually going a lot faster than we, I think. But, anyway in this box we have some moths, we have some bees, and we have some flies. Well, we have some larvae moths which are positioned around. This experiment was proposed by a young man from Rose Creek, Minnesota, a high school student, who entered a national contest for high school students and the one who won and because of that he has his experiment on the spaceship Columbia and there'll be some others on other flights in the future in order to stimulate interest among high school scientists as far as space program. And this is a study in how flying insects behave in a gravity free environment. And we have two kinds, essentially. One kind with a very big wing and the other kind in a very light body and the other kind with a heavier body and a small wing and so you see we have the two extremes. And most of them have positioned themselves around the periphery of the box to fasten themselves onto something. Unless we aggitate them a little bit and make them get going. Now seems like the moths are doing real better than the bees. The bees are just sort of tumbling around without flapping their wings, but the moths, every once in a while, you see that one flying right there, he seems to have adapted to some degree to 0 gravity and there are a few bees like this one here he's just floating around. He's taking the easy way out like Gordo is now . You don't see Gordo flapping his wings in zero g. So the moths really don't have to do that at all. These were launched with us and it looks like most all of them survived. I think that some of these larvae here will hatch while we're up here. Now the bees and the moths don't go hungry. They actually have something to eat. Right now in the lower part of the box you see a valve with some sort of a sugar water substance in it, something that you might feed to a hummingbird, I guess you might say and on the end there's a wick so that when they fly up to it and move up to it somehow they can get something to eat.

CAPCOM Columbia Houston, Jack, we've lost your picture now. We're 20 seconds to LOS. Thanks a lot for a great show. Botswana is coming up next at 8 plus 02.

SPACECRAFT Get what you needed?

CAPCOM Yea, thanks a lot, Gordo.

SPACECRAFT (garble) feel like we're (garble) here because I did go ahead and do the suit donned off and (garble).

CAPCOM Roger, we copy, and that's good work.

PAO This is Shuttle Control. We've had loss of signal at Goldstone and Buckhorn. Columbia going down across the western part of Mexico now. Will cross over South America. Next station will be Botswanna in 33 minutes. At the student experiment on television during this pass and pilot Gordon Fullerton reported that he did do the suit donning and doffing today. At 2 days 7 hours 29 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

CAPCOM That should give you P04H.

SPACECRAFT That gave me an A04L.

CAPCOM Okay now I need you to push the O/S key.

SPACECRAFT How are you reading me George?

CAPCOM Loud and clear Jack.

SPACECRAFT Okay I did a 04, and it gave me a A04 Lema.

CAPCOM Roger that Jack, and now we need to push the O/S key.

SPACECRAFT Okay, I did that and nothing happened.

CAPCOM Roger Jack, we're one minute to LOS and the plan is to hit the OS to key again, that should give you a PO4H and then the enter key, and that should give you a H04H, over.

SPACECRAFT Okay, tell me what to punch again?

CAPCOM Roger Jack, we'll forget the GAS for a while. We need to get payload aft Main B to on again, and one more note, the water pump that's coming up will be tank Bravo, and that's at 30 percent, over.

SPACECRAFT P/L Aft Main B is on, and 30 percent tank B.

CAPCOM Roger Jack, plan on going LOS, and we're all set for watching the TV over the states, over.

SPACECRAFT Okay.

PAO This is Shuttle Control, Guam has loss of signal. Columbia misses Hawaii on this orbit. Next acquisition through Buckhorn in 15 and 1/2 minutes and we'll have television through Goldstone of the student experiment, the flying insects, the bees and moths experiments, during the pass over the United States on this orbit. At 2 days 7 hours 5 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 7 hours 19 minutes mission elapsed time. Columbia's 30 seconds away from acquisition through Buckhorn.

CAPCOM Columbia, Houston is with you through the States, over.

SPACECRAFT Okay George we're reading you loud and clear.

CAPCOM your the same and we're looking forward to the bees and moths.

SPACECRAFT Okay, we're just getting this set up, give us about, how long of a pass have we got for them?

CAPCOM Roger, six minutes Gordo.

SPACECRAFT We'll be ready in about two.

CAPCOM Roger that.

CAPCOM Columbia, Houston we're seeing some TV now.

SPACECRAFT Okay, we're just getting it all arranged here. can watch for set up.

CAPCOM Columbia, Houston we had a good shot there. The moths ..

SPACECRAFT Okay, well it's running a little late, but the idea here is will try to show here shortly, okay Pinky?

CAPCOM Roger Gordo.

SPACECRAFT Okay we're starting all.....

CAPCOM We're ready.

SPACECRAFT Okay, we've got a camera set up and the Commander Jack Lousma is way back there in the corner where the insect experiment is taking it out of the drawer and is there, and bringing it out to tape it to the wall of our airlock. As you can see, there's lots of action in the box. That's good. That's right on, Houston are you selecting cameras as desired there.

CAPCOM Roger Gordo, we've got a close up of the box now.

SPACECRAFT Okay, well you can switch as you see fit between the close up shot and the right angle if you like.

CAPCOM Roger we'll do that. 3 and a 1/2 minutes.

SPACECRAFT Okay, cause we ran out of hands to do all of this at once. Well I'll turn it over to Jack to kind of describe just which ones are flying and what he sees as he stands real close.

CAPCOM Roger, and we're standing by.

SPACECRAFT Say again Houston?

CAPCOM We're standing by for the CDR.

SPACECRAFT Okay, Hello there Space fans, here we are in the good ship Columbia, speeding over the United States.....

END OF TAPE

CAPCOM ..when your ready.

SPACECRAFT Okay go ahead.

CAPCOM Roger, we'd like you to check relay number 3, we can do that by clearing and entering a 3 on see if it's in the latens mode, see if relay 3 is not latent, we'd like you to put it to HOT, if it is then go back to relay 4, and put it to latent, over.

SPACECRAFT How bout you just telling me the procedure and I'll do it like you say it.

CAPCOM Roger Jack, we'll get that to you at Guam. 30 seconds left this pass. One other thing, at 6 hours and 21 minutes you becamP$zYh,.Y4W-
/ZokW+/Z-/Z +
Z_+L @@r4+k/WZVKoW¼W+WZ?+Z¼/_=-,+ZK/kKo VWL @@36iOht soHfar anL I hohe we canHc7nlivme it foj a fewDm7je days
here.

SPACECRAFT Thanks, that is record probably soon to be broken but, we'd like to more than double that.

CAPCOM Roger that. Guam is next at 6:58.

SPACECRAFT Okay.

PAO This is Shuttle Control, Columbia is gone out of the range of the Botswana station. Next is Guam in 28 minutes. CAPCOM passed up procedure for the getaway special during this short pass and also congratulated the crew for becoming the crew with the most time in the space shuttle orbiter. Exceeding the record at 2 days 6 hours 21 minutes. At 2 days 6 hours 30 minutes this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 6 hours 57 minutes, mission elapsed time. Columbia has started its 38th orbit. And is 30 seconds away from acquisition through Guam.

CAPCOM Columbia, Houston through Guam for 6 minutes.

SPACECRAFT Read you loud and clear.

CAPCOM Roger, your loud and clear also. And Columbia, Houston, we'd like to do some trouble shooting on something we see in the IECM on panel R1 see if you can get payload afts Mn-v B to off, we'd like to leave it off for 4 minutes, and we'll call up to turn it on, over.

SPACECRAFT Stand by one.

SPACECRAFT Okay, you want payload aft Main B off?

CAPCOM That's62firmative.

SPACECRAFT It's off.

CA;Z¢SPP Okay, thank you. And Jack I have the GAS procedure when your ready.

SPACECRAFT Stand by one. Okay you just going to read it while I do it?

CAPCOM Yes, it's pretty straight forward, first thing is we'd like to get the position of relay 3.

SPACECRAFT Okay, I got it cleared, what's next?

CAPCOM Okay, if you'll enter a 03 we can see what that current state of relay 3 is.

SPACECRAFT Okay, we got it cleared, what's next?

CAPCOM Roger Jack, we'd like to put into relay 03 to see what state that is in.

SPACECRAFT Okay what you need to do is read me the procedure.

CAPCOM Roger, that will be just enter a 03.

SPACECRAFT Okay, I get A03L.

CAPCOM Roger thank you, now you can clear again.

SPACECRAFT Okay.

CAPCOM Now enter a 04.

SPACECRAFT Go ahead.

CAPCOM Roger Jack, now you can enter 04.

CAPCOM Columbia, Houston how do you read Jack?

SPACECRAFT Okay loud and clear now George. Go ahead.

CAPCOM Okay, I'd like you to enter 04 on the hand controller.

SPACECRAFT Okay. Okay I entered 04, and got A to 04 L.

CAPCOM Roger, and enter in then OS.

SPACECRAFT Copy.

CAPCOM That should give you a P04H.

SXtECRAFT That give me a A04L.

CAPCOM Okay, now I need to p UU:he O/S key.

SPACECRAFT ... reading you George.

CAPCOM Loud and clear Jack.

END OF TAPE

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SPACECRAFT Okay, that's good. when I punched the numbers into the getaway special controller the answers came out to be the ones that you'd expect in the second half other than the ones you'd expect in the first half.

CAPCOM Yea, we understand Jack, we're just trying to get the payloads guy to decide what he wants to do, over.

SPACECRAFT Okay, we'll work it out what ever way he likes. We got a great view of Lake Mead and the Grand Canyon.

CAPCOM Roger, Jack, we're sure there.

SPACECRAFT George, we're getting a couple of good pictures of our landing site come Monday and looks like super clear day on White Sands. Hope we got one like that Monday.

CAPCOM Roger, Jack, we do to. And Columbia, we're 30 seconds from a 1 minute LOS over the states.

SPACECRAFT Okay, got a good shot of the Midland Odessa.

CAPCOM Roger, I'm afraid it's a little cloudy outside here. You can see us.

SPACECRAFT Looks like it might be a little overcast in Houston today, George.

CAPCOM Yea, I'm afraid so, Jack. Been raining last couple of days. Columbia Houston, we're 1 minute to LOS. Botswana's next at 6 plus 28 and a reminder, we're looking forward to a TV of the bees and moths coming up and I'd like to see how Gordo's doing in his suit donning.

SPACECRAFT Okay. (garble) .

PAO This is Shuttle Control. Columbia out of range at the Merritt Island Florida station now. Heading down across South America on orbit number 37. Start of this pass considerable discussion between Jack Lousma and the ground on the getaway special canister. Lousma reporting that he did half of the procedure last night and then became distracted and did not finish it. Came up to time to do it again today and it was not in the proper configuration. He's been taking photographs on this trip across the United States. Reported a super clear day at White Sands. Says he got some good photographs of Midland and Odessa, Texas. Commented on Houston's cloud cover. Next station is Botswana in 24 minutes. At 2 days 6 hours 3 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 2 days 6 hours 27 minutes. We have acquisition at Botswana.

CAPCOM Columbia Houston through Botswana for 1 and 1/2 minutes.

SPACECRAFT Okay, George, hearing you loud and clear.

CAPCOM Roger, Jack. The payloads guys have looked at the FPEG and determined that it's working OK. And standby. And Jack, I have a short GAS procedure when you're ready.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, we'd like you to check relay number 3. You can do that by clearing and entering a 3 and see if it's in the....

END OF TAPE

PAO and the Columbia's commander's point of view. At 2 days 5 hours 31 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Columbia Houston through Hawaii.

SPACECRAFT Okay, we're hearing you through Hawaii, George. And I've got a comment about the getaway special.

CAPCOM Okay, go ahead.

SPACECRAFT When I, okay, when I typed in the numbers on 4-42 I came up with a second half of the sequence. So apparently at some time in the past we have done the first part of the sequence and we're instructed to wait 10 minutes and forgot about it so the things that were sitting there in the first half of one of those sequences, probably which was last night I'm not sure, but I think that was the last time we fooled with it, so right now it's sitting in the hot to late LO4L is tripped and the question is do you want it to sit there like that for awhile or do you want to start a new sequence?

CAPCOM Okay, standby, we'll get an answer on that, Jack. Here on the aft flight deck, I've got a configuration on panel A12 for you.

SPACECRAFT Alright.

CAPCOM Okay, it's APU heater, on the top row lube oil line 1 should be in B auto.

SPACECRAFT Okay.

CAPCOM And Jack, we think you just bumped the switch on that one.

SPACECRAFT Yea that's probable.

CAPCOM Columbia, we're 30 seconds LOS. Buckhorn is at 46 and we'll get you an answer on the GAS there.

SPACECRAFT Okay, my guess is that if your look on page 4-20 (garble) last night and I did the first half of that and forgot to do the second half for having to wait 10 minutes and that's the problem we identified before this all happened about this waiting 10 minutes.

CAPCOM Yea, I agree, Jack.

PAO This is Shuttle Control. Loss of signal at STS-3

Hawaii. Buckhorn in about a little over 4 minutes. At 2 days 5 hours 42 minutes mission elapsed time this is Shuttle Control. This is Shuttle Control at 2 days 5 hours 45 minutes mission elapsed time. Botswana will acquire Columbia in about 15 seconds.

CAPCOM Columbia Houston with you over the states.

SPACECRAFT Okay, go ahead George.

CAPCOM Roger, Jack, on the GAS we'd like to backup and review the bidding on that one, so if you could give us a summary of what you think's happening the last day then we can synch up on it.

SPACECRAFT Okay, I think last night on page 4-29 I did the first half of that and I got distracted and did not do the second half, so it's been sitting there waiting to do the second half all night till now.

CAPCOM Okay, Jack, thanks.

SPACECRAFT And that's a write in, of course, and that's what we were saying before flight about all these last minute changes and it just goes to show you what happens.

CAPCOM Yes we hear you Jack.

SPACECRAFT They just for a little bit of easier reducing data or something they might win the battle but lose the war. I know you're not responsible for it, George. (garble) you probably remember our conversation.

CAPCOM Sure do, Jack.

SPACECRAFT I didn't do that on purpose either. George, you want us to turn off the display switch on the OSS command status display panel, just to save the red letters?

CAPCOM Roger, Jack, you can go ahead and shut that down.

SPACECRAFT Okay, that's done. Now when I punched the numbers in the getaway special controller the answers came out to be ones you'd expect in the second half other than the ones you'd expect in the first half.

END OF TAPE

(garble)

PAO This is Shuttle Control at 2 days 5 hours 23 minutes mission elapsed time. Shuttle orbiter is approaching acquisition through Guam and just beginning its 37th orbit.

CAPCOM Columbia, Houston with you through Guam for 6 minutes.

SPACECRAFT Okay, through Guam looks like we got the rotation going and go ahead with the speaker.

CAPCOM Roger Jack. Columbia, Houston, Jack if your ready to adjust the speaker volume I can give you a long count.

SPACECRAFT Oh no I'm not ready. Okay, ready for a short count George.

CAPCOM Roger, Columbia, Houston with a short count. 1, 2, 3, 4, 5, 4, 3, 2, 1, count out.

SPACECRAFT Okay, do it again.

CAPCOM Roger Jack, one more time with the short count. 1, 2, 3, 4, 5, 4, 3, 2, 1 count out.

SPACECRAFT Seems to work okay, how do you read me George?

CAPCOM Roger Jack, I'm reading you loud and clear.

SPACECRAFT Okay, let me speak to you through the speaker I'll turn off the headsets so and we'll get the feedback.

CAPCOM Roger that Jack, and it sounds real good. And Jack verify that your reading us...

SPACECRAFT .....FPEG offscale low or something like that?

SPACECRAFT FPEG....

CAPCOM Roger Columbia, read you got a message FPEG off scale low?

SPACECRAFT Says that an O/L, whatever that means off scale lower and out of limits probably.

CAPCOM And Jack, your comm is pretty noisy over that speaker box, and we're looking at the FPEG for you.

SPACECRAFT Say again about the speaker box.

CAPCOM Roger, your comm is a little scratchy over the

speaker box, can you describe the quality of ours?

SPACECRAFT ....yours is acceptable I'd say pretty good.

CAPCOM And Jack, that is good news. And did you have to cycle the circuit breaker to get it back?

SPACECRAFT No the circuit breaker was in.

CAPCOM Okay, thank you.

SPACECRAFT The only switch we moved was the CCU power on the old station, it was on speaker.

CAPCOM Okay, we copy the CCU power was on. And Jack we see the star trackers need items 3 and 4, need to recall spec 21 and release it and cycle the shutters on the star trackers also, over.

CAPCOM Columbia, Houston 1 minute in this pass. The ground is commanding the FPEG now nothing for you to worry about there. We assume that the speaker box test was 100 percent successful and that you'll be using it tonight for your sleep, over.

SPACECRAFT That's affirm.

CAPCOM Roger that, and did you copy the startracker?

SPACECRAFT Yes, I'll do the startrackers spec 21 also, right?

CAPCOM That's right, spec 21 and item 3 and 4 and cycle the shutters.

SPACECRAFT Okay, I did it and they immediately went closed.

CAPCOM Roger, it looks good, a short Hawaii pass is next.

SPACECRAFT And both the are looking at the Earth, I guess that's the reason.

CAPCOM Copy that.

PAO This is Shuttle Control, Guam has loss of signal. Next station is Hawaii with a short pass of just over half a minute, that Hawaii pass in 10 and 1/2 minutes. Over Guam, Jack Lousma and CAPCOM George Nelson ran a test on the middeck speaker box, adjusting the volume and it appears to work satisfactory both from the grounds point of view and the Columbia's commanders point of view. At 2 days 5 hours 31 minutes this is Shuttle Control Houston.
END OF TAPE

SPACECRAFT (garble)

CAPCOM Okay, Jack, we copy all that and thanks alot. For Gordo, with the cassette in the VTR you can go ahead and take the scissors and cut that tape if you need it to get it out of the VTR, over.

SPACECRAFT Okay, but I hate to cut it and then have little pieces all stuck in there, just a second there, I'll handle it.

CAPCOM Roger, that and we're 30 seconds LOS. And Yarragadee is next at 5 plus 11 and Jack, just a reminder, we're going to be wanting to troubleshoot the speaker box on the aft flight deck later on, over.

SPACECRAFT Okay.

PAO This is Shuttle Control. Botswana has loss of signal with Columbia. Spacecraft moving out now over the Indian Ocean toward the tracking station in Yarragadee, Australia. Acquisition there in 13 minutes. At 2 days 4 hours 58 minutes mission elapsed time this is Mission Control Houston. Columbia Houston through Yarragadee for 6 minutes.

SPACECRAFT Hello Houston.

PAO And Columbia, I've got an attitude for you at the next ascending mode if you want to copy.

SPACECRAFT Okay, go ahead, Binky.

PAO Roger, I'd like you to maneuver to roll 90 degrees, pitch 4.2, yaw 1.8, and start the 2 times orb rate rotation at 5 hours 23 minutes 49 seconds, over.

SPACECRAFT Okay, I copy 5 23 49, roll command 0, pitch 4.2, and yaw 1.8, is that affirm?

CAPCOM That's affirmative. And we'd like to also change your discrete rate in DAP A4 from .134 to .135.

SPACECRAFT Okay, I suppose we can do that right now, can't we?

CAPCOM That's affirmative. And Columbia Houston, I've got a slight mod to the speaker box checkout procedure that's on teleprinter message 15 bravo. That was the Cap change message that went up this morning.

SPACECRAFT I have it here in my hand.

CAPCOM Okay, and correction, that was 15 Charley, and on line 34 notice we left that line blank and that's so we could

write in. We'd like you to take the mode to PTT PTT, over.

SPACECRAFT Okay, that's mode PTT PTT and line 34 and I was getting messed up a little bit with a piece of tape, could you tell me what line 26 says after CCU power?

CAPCOM Roger, it says off, harens verifying.

SPACECRAFT Okay.

CAPCOM And Columbia, Jack, if you think you've got time we could get this out of the way at the next Guam pass coming up.

SPACECRAFT How long's that, George?

CAPCOM That's 9 minutes from now. And there's no rush on that.

SPACECRAFT Okay.

CAPCOM Columbia Houston. 50 seconds to go. Guam is next at 5 plus 23 and for Gordo, did you have any luck with the tape in the VTR?

SPACECRAFT I broke it like you said, pulled it out of there. I think it's OK now. And Binky, The ascending mode here has changed. Cause I'm looking at the (pause) . It's a different bag, I guess that's the reason for it, huh.

CAPCOM That's affirmative, Jack. Use the time we read up. And there's 16 minutes delta.

PAO This is Shuttle Control. Yarragadee has loss of signal. On this orbit Guam is next in 6 minutes. At 2 days 5 hours 18 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 2 days 5 hours 23 minutes mission elapsed time. Shuttle Orbiter is approaching acquisition through Guam and just beginning it's 37th orbit.

CAPCOM Columbia Houston with you through Guam for 6 minutes.

SPACECRAFT Okay through Guam, looks like we got the rotation going and go ahead with the

END OF TAPE

16 were the first ones in and they were gonna intersect right at point alpha. The forward latches number 1 through 4 were coming in they were still up from where the last latches were but their trajectory would have intercepted that horizontal leg about a third of the way from A to B. Is that understandable?

CAPCOM Roger Gordo. That's a good description. Thanks a lot.

CAPCOM Columbia, Houston. Don't know if you've gotten a chance to read the PGU temps today. We'd like to get an idea of how those have been running.

SPACECRAFT ...turn you over to the gardener and he'll read them to you.

CAPCOM Okay thanks.

SPACECRAFT Okay here's another episode in the story of old Jack in the Beanstalk. Which one does he want just the last one or I've got a couple.

CAPCOM We'd like them both Jack please.

SPACECRAFT Say again.

CAPCOM We'd like both the morning and afternoon.

SPACECRAFT Okay this one is at 1/2145. All the lights were in the right configuration and the temperatures were starting with number 7, 22.7 22.6 22.3 22.5 23.0 and 23.8. The one I just read a while ago was day 2/4 hours and 15 minutes all the lights were the way they ought to be. Temperatures starting with number 7, 26.0 26.1 25.8 25.8 26.4 27.4. Over.

CAPCOM Okay Jack. We copy all that and thanks a lot. For Gordo with stuck cassette in the VTR you can go ahead and take the scissors and cut that tape if you need it to get it out of the VTR. Over.

END OF TAPE

SPACECRAFT ...Okay.

CAPCOM Columbia, Houston. A minute left in this pass. For our information, did you get video tape recording of the payload bay door closing yesterday afternoon.

SPACECRAFT No we didn't Pinky. We got in a rush and just looking at it it just really looked like it wouldn't have proved a thing to you. So we real-time didn't mess with it so we tried to get those theodolite readings and put all our emphasis on them.

CAPCOM Okay. Gordo that's no sweat. Good to hear that it was nominal.

SPACECRAFT The door, the port door just came down absolutely flush on both ends as we could tell visually. And we couldn't see how any VTR or anything would have helped enhance your analysis.

CAPCOM Roger Gordo we copy that. We're 15 seconds LOS. Botswanna is next in 5 minutes.

SPACECRAFT Speaking of VTRs, I've got a mess here. The tape from this cassette I'm trying to pull out is all down in there pulling out of the cassette. It's jammed in there you might think about that and we'll talk about it in a minute.

CAPCOM We copy.

PAO This is Shuttle Control. Ascension has loss of signal next station Botswana in 5 minutes. At 2 days 4 hours 47 minutes Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 4 hours 52 minutes Mission Elapsed time, we're standing by for acquistion through Botswana.

CAPCOM Columbia, Houston through Botswanna for 4 1/2 minutes.

SPACECRAFT Okay got you loud and clear.

CAPCOM Roger Gordo. A couple of little things when you did the overlap check yesterday on the payload bay doors I wonder if you could give us a reading on the overlap that was on the diagram on 4-26 in the CAP.

SPACECRAFT There wasn't any. It looked like the just a minute let me check my notes. Okay Pinky, basically they were all the latches best we could tell were coming in on pretty much the no deflection trajectory although the top latches number 12 through

the techniques he used to grapple the plasma diagnostics package without the use of the wrist camera. Hank Hartsfield is the Pilot for STS-4, the next Shuttle mission. We also had good television throughout this pass, television tour across the country, and the end of the pass was devoted to private medical conference, at 2 days 4 hours 32 minutes mission elapsed conference, this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 4 hours 41 minutes mission elapsed time. Shuttle about 30 seconds away from acquisition through Ascension Island.

CAPCOM Columbia, Houston through Ascension for 4 and 1/2 minutes, how do you read?

SPACECRAFT Okay, I'm getting a cyclic PDRS temp message every couple seconds and I'm going to see if I can see which one is coming out.

CAPCOM Roger Gordo, we copy and we're ready to take the RMS heaters to auto, over.

SPACECRAFT one on seven is -10, is that too cold?

CAPCOM Negative Gordo, that's not too cold, but go ahead and take the RMS heaters to auto.

SPACECRAFT They are in auto. Need to figure out a way to override this because its clobbering our caution and warning.

CAPCOM Yes, we can see that down here Gordo.

CAPCOM Columbia, Houston, Gordo we see temps coming up and it should stop your messages fairly quickly.

SPACECRAFT Okay.

CAPCOM Columbia, Houston a minute left in this pass. For our information did you get video tape recording of the payload bay door closing yesterday afternoon?

SPACECRAFT No I didn't Binkey, we got in a rush.....

END OF TAPE

SPACECRAFT on the ground and lots in between.

CAPCOM Roger Jack, 30 seconds to a short LOS here. Absolutely fantastic television, makes me wish I'd stowed aboard.

SPACECRAFT Well, we got room for you George, but you will be far away.

CAPCOM And Columbia we've got the Med conference coming up here at 4 plus 23.

SPACECRAFT Okay, I bet just, I bet what your looking at will be a lot more interesting.

CAPCOM That's for sure.

CAPCOM And Columbia, Houston we're back with you for 3 minutes.

SPACECRAFT Okay, just had a PDRS temp...

CAPCOM Roger, we're ready Gordo. Columbia, Houston, Gordo we're looking at the temps right now and no action for the moment.

SPACECRAFT where we are George, but the land marks we see on the ground aren't all that distinctive at this point, and then when they do become that way we seem to be covered with clouds. But this is a good old America from see the shining sea in just 12 minutes, and it really is America the beautiful.

CAPCOM Roger that Jack.

SPACECRAFT We can even see some airplane contrails down there. Looks like they're heading toward Chicago.

CAPCOM Roger, and we've got just a few seconds left, and the Med conference is next.

SPACECRAFT Well looks like probably a good time for Med conference because we're getting overcast clouds, looks like they got a lot of weather over the Eastern part of the United States today.

CAPCOM Roger, and we'll see you later.

PAO This is Shuttle Control at 2 days 4 hours 31 minutes mission elapsed time. Columbia is beyond the range of the Bermuda station now. Heading down over the south Atlantic Ocean. Next station is Ascension Island in 10 minutes. During this pass over the U.S. Astronaut Henry Hartsfield told the crew about the grapple test that he ran here on the ground, described

CAPCOM Columbia, (garble) the delta camera is yours for awhile. And Columbia, we're looking in the overhead windows at you.

SPACECRAFT Okay. What you're looking at going by straight back from us is was Lake Tahoe. Went by pretty quick, but now you're seeing the mountains through Nevada here with snow on most of them, but still dry ground in the valley. I was hoping to catch San Francisco but I didn't get it away quick and we went right over the Golden Gate just a couple of minutes ago.

CAPCOM Roger, we're getting the scene from the delta camera now. It's really a beautiful site Gordo.

SPACECRAFT Okay, we're coming over some of the beautiful sand dessert. The colors are even more descriptive, more colorful from up here because you can see all of them together. They're as colorful as the pictures you see. You don't realize it when I'm on the ground but they're a very beautifully Painted Desert.

CAPCOM Roger, Jack, looks good to us and we can also see both wings in the picture. That's a pretty machine you're flying in also.

SPACECRAFT It is that. It really flys smooth. And now we're coming over some snow covered mountains. And right directly below us we can see the circular shaped irrigated fields all messed up together, all different colors like a checkerboard. Okay, now we're coming over some midwestern farmland, you can it looks like a patchwork quilt. Farmers have all their fields in different States of cultivation or growth and some are dark green and some others are very light brown and lots of in between.

CAPCOM Roger, Jack, 30 seconds to a short LOS here. Absolutely fantastic television, makes me wish I'd have stowed aboard.

SPACECRAFT Well we got room for you George, but you won't be far away.

CAPCOM And Columbia, we've got the med conference coming up here at

END OF TAPE

CAPCOM Columbia Houston with you through Buckhorn for 7 and 1/2 minutes.

SPACECRAFT Got you loud and clear at Buckhorn.

CAPCOM Roger, Gordo, and I've got Hank Hartsfield standing by here with some good news on PDP grapple techniques if you'd like to listen.

SPACECRAFT Go ahead Hank.

CAPCOM Okay, Gordo, TK and I went over yesterday to MDF and we made 5 complete grapples without benefit of the wrist camera and we also played around with it quite a bit in and around the grapple pin, and as you hinted around yesterday, it is really not all that difficult to do. We used everything at our disposal using both alpha and delta cameras and the digital readouts. We did it without the benefit of the cameras, just using the digitals.

SPACECRAFT Okay

CAPCOM We got a good picture down here now and just using the digitals and visual and we did it also just purely visual and we had no problems with any of it, you just have to take it a little slower as you might surmise and use your eyeballs now. The technique that we recommend to you is to take it to the high howver position using the commanded operator command maneuver and then verifying the roll angle per the cue card, the wrist roll. Then all you got to do in Orbiter unloaded is just do a plus C maneuver around till you get near the vicinity of the grapple pin right near the top and at this point I'd recommend once again checking your position and attitude coordinates and your wrist roll angle, dressing that up. And then using alpha and delta which does give you a little bit of an angle judge whether you think the X-Position is proper. You won't have any trouble at all, of course, with the other positioning of fore and aft tilt or left right tilt, but the X-Position is the most difficult as you might imagine to judge. But with those cameras and your eyeballs you can get it pretty well and from then on all you got to do is drive it right on in and do a grapple.

SPACECRAFT Okay.

CAPCOM And we're not going to pursue that any further unless you have some questions or you can think of something else you would like for us to try for you.

SPACECRAFT Yea, I think that's all the help I need. I appreciate that though. Hank, can I take the d-camera away from you for a minute?

CAPCOM ...disregard the limits on that check in the checklist. Over.

SPACECRAFT Okay. I'll make it up.

CAPCOM Columbia, Houston. We're one minute to LOS Hawaii is next at 4+02 and for information during the next states pass we're planning a med conference over the Bermuda pass and that will be at 4+23 and also we've got Hank Hartsfield standing by to talk to you about his experiences over in MDF if you'd like to talk to him over the states. Over.

SPACECRAFT Okay that sounds like a good idea.

CAPCOM Okay. We'll see you Hawaii.

SPACECRAFT And the PAO pass is going right in the middle of that right.

CAPCOM Yeah, that's affirmative and we'll be running the cameras on that.

PAO This is Shuttle Control. Yarragadee has loss of signal. Columbia does not come in contact with Orroral valley station on this orbit. Next acquisition through Hawaii in 18 minutes. During the next pass over the United States astronaut Hank Hartsfield will talk to the crew about the simulations he has conducted working out procedures for grappling the PDP with the remote arm without the use of the wrist camera. At 2 days 3 hours 45 minutes Mission Elapsed Time this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 4 hours 1 minute Mission Elapsed Time, Columbia will be within range of the Hawaii station in about 40 seconds. Hawaii reports trouble with the antenna drive system and does not believe they will be able to support us in S band but we believe we can get UHF communications at that station. We'll standby.

CAPCOM Columbia, Houston through Hawaii for 5 1/2 minutes UHF only how do you read.

SPACECRAFT Loud and clear.

CAPCOM And you're the same. And okay. Enjoy your lunch.

CAPCOM Columbia Houston how do you read.

SPACECRAFT Go ahead.

CAPCOM Roger Jack. We were wondering here if you had any plans something you wanted to do during this PAO TV maneuver STS-

thats coming up over the states.

SPACECRAFT ....we're all set up for it. We've got delta on an looking up at the elbow camera and the elbow camera is on looking at the Orbiter. I can start out any way you want on it. And it's up to your call I can pan it or you can.

CAPCOM Okay Gordo. In that case I think we'd like to drive the cameras from the ground here and give you a chance to talk to Henry about the PDP.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. One thing that would help the INCOs out if we could start out with camera delta zoomed in on the flag on the pallet. Over.

SPACECRAFT Okay that's right. We wanted to start that way and I'll do that.

CAPCOM Okay thank you and we're one minute to LOS. And the states are next 12.

PAO This is Shuttle Control. Hawaii has loss of signal. Columbia will be at Buckhorn in 3 minutes. At 2 days, 4 hours 9 minutes Mission Elapsed Time this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 4 hours 12 minutes Mission Elapsed Time. Columbia coming up on acquisition through Buckhorn.

CAPCOM Columbia, Houston with you through Buckhorn for 7 1/2 minutes.

SPACECRAFT Got you loud and clear at Buckhorn.

CAPCOM Roger Gordo and I've got Hank Hartsfield standing by here with some good news on PDP grapple techniques if you'd like to listen.

SPACECRAFT Go ahead Hank.

END OF TAPE

PAO This is Shuttle Control Houston, This is Shuttle Control at two days three hours seventeen minutes mission elapsed time. Columbia's five seconds away from acquisition at Botswana.

CAPCOM Columbia, Houston through Botswana for six and a half minutes.

SPACECRAFT Five square George.

CAPCOM And your the same Jack.

CAPCOM Columbia, Houston, Jack I've got the, our latest thinking on the WCS situation if you want to listen.

SPACECRAFT Yes, and I'll probably get more and more interested in that as the time goes on.

CAPCOM Oh, roger that, our thinking now is that there might be a bag stuck on the tie ins down in the bottom of the WCS which is putting a drag on the motor, we think the system should work not a 100 percent but should be effective in the emesis mode, and you can use it in that mode if you can, and then if the bag does break free and starts to run properly you can go ahead and use it normal ops over.

SPACECRAFT Okay, thank you.

CAPCOM Roger, and there's no visibility to see if there's a bag stuck down there, because the transport tube is in the way, over.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, Jack one more thing, if the slinger does stop completely we'd like to know about it, we have a couple more tricks up our sleeve that we could try, over.

SPACECRAFT Okay, that is kind of a bad choice of words because if you wanna try'em I'll probably be up to my sleeves.

CAPCOM Glad to hear your feeling better Jack.

CAPCOM Columbia, Houston we're one minute to LOS, Yarragadee is next at 3 plus 37, and Gordo you might give a push on the end blocks on the EEVT and make sure they are seated in there firmly that might affect the temperatue reading, over.

SPACECRAFT Okay, I'll double check that.

PAO This is Shuttle Control, Columbia's out of range at Botswana now, next station at Yarragadee in 12 and 1/2 minutes. CAPCOM George Nelson told Jack Lousma during this pass that the

waste collection system should work in the emesis mode the slow speed mode, and that eventually if it will work in that mode, it eventually free up and work properly. At 2 days 3 hours 25 minutes this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days 3 hours 35 minutes mission elapsed time. The student experimenter Todd Nelson who's insect inflight experiment will be conducted aboard Columbia later today will be available at room 135 in the JSC newscenter between 2 and 3 p.m. Central Standard Time today. That's the student experimenter Todd Nelson available at the JSC newscenter between 2 and 3 p.m. Central Standard Time today. Columbia is 1 minute away from acquisition through Yarragadee during the end of its 35th orbit, we'll stand by for conversation at Yarragadee.

CAPCOM Columbia, Houston through Yarragadee for 7 minutes.

SPACECRAFT Okay, your loud and clear George.

CAPCOM Roger, and Gordo we have some more information on the EEVT. Evidently the transducers on the remaining samples including number 4 that's in there are different than the first 3 and we expect all the temps to read low and you can disregard the limits on that check, and the checklist, over.

SPACECRAFT Okay, I'll make a note.....

END OF TAPE

SPACECRAFT I'm reading you loud and clear now, George, how me?

CAPCOM And you're loud and clear, Jack, I think we're had a keyhole problem there. Did you copy the transmission on the EETV?

SPACECRAFT No I did not. You probably didn't copy mine either. When I went for your heater switch I invariably got the power switch which I cycled on back on in the RMS before I got the heater and I wonder if I need to reset anything other than the IO item 5?

CAPCOM Roger, standby, and while we're checking on that. Okay, Jack, that's no impact in resetting the IO is per procedure and verify the heaters are off.

SPACECRAFT Yea, the heaters are off but they left me with a GPC data light.

CAPCOM Okay, Jack, and to get rid of that you just need to cancel safety.

SPACECRAFT Okay, I did that. Took the data light away and got a gray for a safety.

CAPCOM Roger, that should put you in good shape and as far as the EEVT is concerned, the 8 degrees is no problem to us and we're go for OPS normal.

SPACECRAFT Roger.

CAPCOM And Columbia, we're 30 seconds LOS. Botswana is next at 317.

SPACECRAFT See you at 317 and it's just getting dark up here.

CAPCOM Roger that, Jack.

PAO This is Shuttle Control. Columbia out of range at Ascension. Next station Botswana in 4 and 1/2 minutes. During this pass Gordon Fullerton still working on sample number 4 of the electrophoresis test and Jack Lousma conducting continuing to conduct the TACAN test that started a couple of orbits ago. At 2 days 2 hours 13 minutes mission elapsed time this is Shuttle Control Houston.

END OF TAPE

SPACECRAFT Good. And I see you have some live TV coming up over Goldstone using the elbow camera off the arm, I guess.

CAPCOM That's affirmative, Jack, we'd like to press ahead of that if we could. Columbia Houston, Gordo, we'd like to get the RMS heaters off now.

SPACECRAFT Say again.

CAPCOM We'd like to get the RMS heaters to off.

SPACECRAFT Now?

CAPCOM That's affirmative.

SPACECRAFT Okay, I've got the heaters off.

CAPCOM Okay, thank you.

SPACECRAFT Okay, turn to page 1-11 in the payload checklist.

CAPCOM Roger, standby 1, and that RMS heater call was part of the thermal DTO. Okay, Gordo, we've got our checklist out, go ahead.

SPACECRAFT Okay, the next to the last line says check column temp 12 to 15. It's been 4 minutes since they've started this in electrophoresis and looks like it's stabilizing at plus 8 degrees, the voltage is good, 307, and the TE TEMP is plus 11.

CAPCOM Roger, we copy that, the temp stabilizing at 8 degrees.

SPACECRAFT That's right, instead of 12 to 15 in the book here.

CAPCOM Right, and we're checking into that Gordo. Columbia Houston, Gordo, we don't think that temperature will affect the sample at all and press on, OPS normal. Columbia Houston, Gordo, how do you read?

SPACECRAFT Got the IO established with 2 item 5, but I don't know what the GPC data lights were.

CAPCOM Columbia Houston, how do you read? Columbia Houston, Gordo, you were very broken on that.

SPACECRAFT How do you hear me now, George?

CAPCOM Roger, Jack, that's loud and clear and did you copy my no impact on the EEVT temp? Columbia Houston, for 2 minutes left in this pass how do you read?